

HP StorageWorks Business Copy XP user's guide

XP48
XP256
XP512

sixth edition (April 2004)

part number: B7906-96005

This guide contains the requirements and procedures for installing and operating HP StorageWorks Business Copy XP.



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About this guide

This guide describes the requirements and procedures for installing and operating HP StorageWorks Business Copy XP on the XP48, XP256, and XP512 disk arrays.

Intended audience

This guide is intended for use by system administrators who have expertise with the associated systems, and software and knowledge of related topics:

- Data processing concepts.
- Direct-access storage device subsystems and their basic functions.
- Disk arrays and RAID technology.
- Operating system commands and utilities.

Related documentation

HP provides the following related documentation:

- *HP StorageWorks Remote Control XP: User's Guide*
- *HP StorageWorks Cache LUN XP: User's Guide*
- *HP StorageWorks Continuous Access XP: User's Guide*

For information about operating system commands and third-party products, refer to the manufacturer's documentation.

Conventions

This guide uses the following text conventions.

Page 24

Blue text represents a cross-reference. For the online version of this guide, the reference is linked to the target.

| | |
|--|--|
| www.hp.com | Underlined, blue text represents a website on the Internet. For the online version of this guide, the reference is linked to the target. |
| literal | Bold text represents literal values that you type exactly as shown, as well as key and field names, menu items, buttons, file names, application names, and dialog box titles. |
| <i>variable</i> | Italics indicate that you must supply a value. Italics are also used for manual titles. |
| input/output | Monospace font denotes user input and system responses, such as output and messages. |
| <i>Example</i> | Denotes an example of input or output. The display shown in this guide may not match your configuration exactly. |
| [] | Indicates an optional parameter. |
| { } | Indicates that you must specify at least one of the listed options. |
| | Separates alternatives in a list of options. |

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www.hp.com

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Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP web site under support:

theneew.hp.com/country/us/eng/support.html

Be sure to have the following information available before calling:

- Technical support registration number (if applicable).
- Product serial numbers.
- Product model names and numbers.
- Applicable error messages.
- Operating system type and revision level.
- Detailed, specific questions.

For continuous quality improvement, calls may be recorded or monitored.

HP storage web site

The HP web site has the latest information on this product, as well as the latest drivers. Select the appropriate product or solution from this web site:

theneew.hp.com/country/us/eng/prodserv/storage.html

HP authorized reseller

For the name of your nearest HP authorized reseller, you can obtain information by telephone:

United States 1-800-345-1518

Canada 1-800-263-5868

elsewhere See the HP web site for locations and telephone numbers:

www.hp.com

Revision history

| | |
|-----------------|---|
| September, 1999 | Open-8 emulation added. |
| January, 2000 | Content extensively revised and reorganized. |
| July, 2000 | Content revised and reorganized. Added support for XP512/XP48. |
| March, 2001 | Added support for XP48, quick split, quick restore, and channel extenders. New screens added. |
| April, 2004 | Added clarifications, new option screen, and updates to error messages. Content revised and reorganized. |

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Description

HP StorageWorks Business Copy XP (BC) creates and maintains copies of disk data which can be used for data backup, data duplication, or testing.

BC creates copies of LUNs within the same disk array as the source LUNs without impacting performance of the primary LUNs. The source volumes are called primary volumes (P-VOLs); the target volumes are called secondary volumes (S-VOLs). The relationship between a P-VOL and an S-VOL is called a pair.

You use the paircreate command to establish pairs. Once a pair is established, updates to the P-VOL are automatically and continuously copied to the S-VOL. There are other commands to temporarily suspend copy operations, resync the pair, and delete the pair relationship.

BC operations are performed on the remote console PC, from the command line interface (CLI) of RAID Manager (RM) on the host, or from the RAID Manager Library API. This book addresses the remote console PC operation. See the HP StorageWorks RAID Manager XP documentation for more information about the CLI.

While BC makes data copies on the local array, HP StorageWorks XP Continuous Access (CA) makes data copies from the local array to a remote array. You can use BC with CA to make multiple copies of volumes at both local and remote sites. See “Using BC with CA” ([page 27](#)).

Volume pairs (P-VOLs and S-VOLs)

BC primary volumes (P-VOLs) contain user data and BC secondary volumes (S-VOLs) contain copies of the data.

You can make up to three S-VOLs from a P-VOL.

By using the Cascade function, you can create an additional pair for each S-VOL, for a total of nine copies of the P-VOL. The cascaded pairs are also S-VOLs. See “Cascade function” [\(page 13\)](#).

Any S-VOL can be split, suspended, resynchronized, and deleted independently from the other S-VOLs assigned to the same P-VOL.

BC supports a maximum of 2,047 pairs per disk array. The maximum number of P-VOLs decreases if you have more than one S-VOL paired to a P-VOL. For example, if you have three S-VOLs paired with each P-VOL, you will have 511 P-VOLs. If the BC pairs include LUSE expanded volumes, the maximum number of pairs also decreases.

Normal operating cycle

P-VOLs are available to hosts at all times for read and write I/O operations (except during the reverse pairresync or quick restore process, or when the P-VOL is in the COPY(RS-R) status).

During the initial copy operation and after the pair is synchronized, you cannot write data to an S-VOL; however, the host can read the S-VOLs during the BC process. You can write to S-VOLs *only* if you temporarily or permanently end the relationship with the P-VOL.

BC updates S-VOLs asynchronously; that is, an update does not occur every time a host issues a write I/O to the P-VOL, so I/O ordering is not maintained.

If you need to access an S-VOL, you can split (pairsplit) the pair to make the S-VOL accessible. While a pair is split, the disk array keeps track of all changes to the P-VOL.

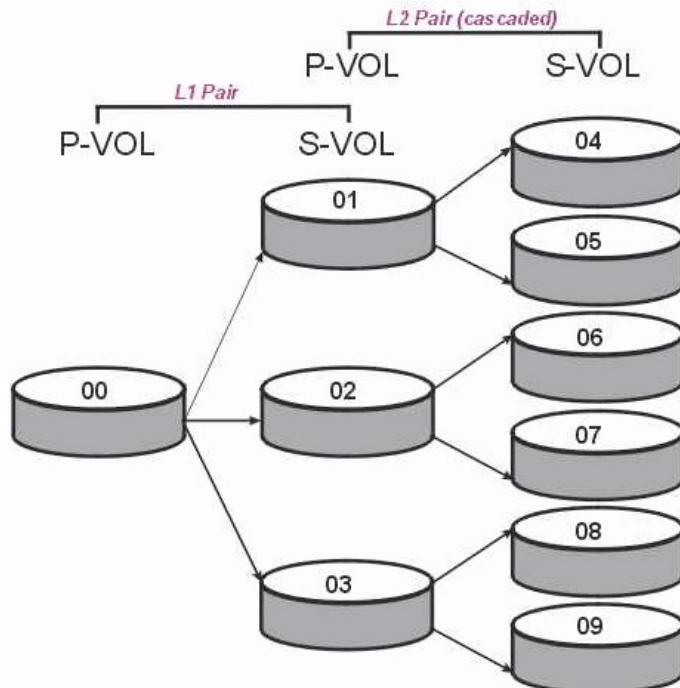
When you resync (pairresync) the pair, the differential data in the P-VOL (due to P-VOL updates) is copied to the S-VOL so the S-VOL is again identical to the P-VOL.

When you no longer need a pair, you can sever (pairsplit -S) the relationship. While this function is known as “delete,” it is only the relationship, or link, between the pair that is deleted.

Cascade function

By using the Cascade function, you can create an additional secondary pair from each S-VOL, giving a total of nine copies of the P-VOL. The cascaded pairs are also S-VOLs.

The two layers of pairs are called L1 pairs and L2 pairs. When L1 S-VOLs are cascaded, they also act as P-VOLs to their associated L2 S-VOLs.



In the L1 layer, you can specify up to three S-VOLs for a P-VOL. In the L2 layer, you can specify up to two S-VOLs for each S-VOL/P-VOL (that is, the S-VOL from L1).

When creating and using cascaded pairs, be aware of the following:

- Create the L1 pair before creating its L2 pair.
- Suspend the L1 pair before splitting an L2 pair.
- You cannot use the reverse-copy and quick restore functions with L2 pairs.
- When you delete an L1 pair that contains an L2 pair, the L2 pair will become a new L1 pair.
- L2 P-VOLs can be split, suspended, or deleted only if the L2 P/S-VOL paired with it is in either a split or suspended state. It must be split or suspended from its L1 P-VOL.

To see how pair status affects L1 and L2 functions, see the tables on [page 25](#) and [page 26](#).

Commands

You issue BC commands through the BC main window. The command descriptions below outline their basic functions and uses.

For details about using the commands, see Chapter 3.

Set reserve attribute

The set reserve attribute command reserves (sets aside) a volume as an S-VOL. You can reserve up to 2,048 volumes in one disk array. The disk array rejects all write I/Os to reserved volumes.

Reset reserve attribute

The reset reserve attribute command removes the reserved status from a volume so that it can be mounted and accessed by all hosts. The disk array will then accept all subsequent I/Os to the volume.

Paircreate (create)

The paircreate command establishes and updates new volume pairs. It copies all data on the P-VOL to an associated S-VOL.

Write operations performed on the P-VOL during the initial copy are duplicated on the S-VOL when the disk array updates the pair. As write I/Os are performed on the P-VOL, the disk array stores a track-level bitmap of the P-VOL's differential data in shared memory. The disk array updates the data based on the amount of differential data and the elapsed time between updates.

The disk array does not maintain I/O order during this process. If I/O ordering is important, use loop-back CA to maintain the order.

If shared memory is lost, the differential bitmap is also lost. In this case the following may occur:

- The disk array treats the entire P-VOL (S-VOL for COPY(RS) pairs) as difference data and recopies all data to the S-VOL (P-VOL for COPY(RS) pairs) to ensure proper pair resynchronization.
- For pairs with COPY(SP) or PSUS(SP) status, the disk array changes the status to PSUE, to ensure proper resynchronization of these pairs.

If shared memory is lost, allow extra time for BC operations.

Cascaded pairs

To create cascaded pairs, use the Cascade option in the Paircreate screen.

Pairsplit (split)

The pairsplit command updates the S-VOL with P-VOL data and makes the S-VOL identical to the P-VOL at the time the split command was issued.

You cannot perform pairsplit on PSUE pairs.

While the pair is split, the disk array establishes a track map for the split P-VOL and S-VOL, and records all updates to both volumes. As an option, full read/write access is available to the split S-VOL even if it is still reserved.

When splitting pairs, you can also select the split types, steady split or quick split.

- Use quick split when fast access to S-VOL data is more important than the performance of the P-VOL during the split. This allows access to the S-VOL with the latest P-VOL information within a few seconds even though the data is still being resynchronized in the background.
- Use steady split when it's important that the P-VOL and S-VOL have maximum performance.

Pairresync (resynchronize)

BC has four pairresync commands.

Normal copy pairresync

The copy direction for a normal copy pairresync is P-VOL to S-VOL. Use normal pairresync when P-VOL and S-VOL performance is crucial.

While a pairresync for a pair in PSUS status can be very fast, the resync operation for a PSUE pair takes just as long as an initial copy.

Quick pairresync

Quick pairresync speeds up normal pairresync by copying the P-VOL differential data without copying all P-VOL data to the S-VOL.

- Use quick pairresync when access to the latest P-VOL data on the S-VOL is more important than the performance level.
- Quick pairresync is not available via RM CLI.

Reverse pairresync

The copy direction for reverse copy pairresync is S-VOL to P-VOL. Use reverse pairresync when the S-VOL data is the most current.

See the table on [page 19](#) for more reverse pairresync information.

Quick restore pairresync

The copy direction for quick restore is S-VOL to P-VOL. Quick restore speeds up reverse pairresync by changing the volume map in the disk array to swap the contents of the P-VOL and S-VOL without copying the S-VOL data to the P-VOL.

See the table on [page 19](#) for more quick restore information.

Effect on RAID Levels

Before performing quick restore, make sure that the P-VOL and S-VOL have the same RAID level and HDD type. This is because the RAID levels and HDD types of the P-VOL and S-VOL are exchanged. For example, if the P-VOL is RAID-1 level and the S-VOL is RAID-5 level, the P-VOL changes to RAID-5 and the S-VOL changes to RAID-1.

If you want to restore the original RAID levels after quick restore, stop host I/Os to the pair, split (PSUS) the pair, perform the quick restore operation for that pair again, and then restart the host I/Os to the pair.

Effect on Cache LUN

Because the Cache LUN settings are exchanged during quick restore, you must perform one of the following actions. If you do not, changing the location of the cache residence areas may cause I/O to the Cache LUN data to be down.

- Set the same Cache LUN setting (locations) for the P-VOL and S-VOL before performing quick restore.
- Release the Cache LUN settings of the P-VOL and S-VOL before performing quick restore, then reset the Cache LUN settings for the P-VOL and S-VOL after the pair changes to PAIR status.

Swap&Freeze option

Swap&Freeze allows the S-VOLs of a BC pair to remain unchanged after a quick restore. The disk array will not update pairs in the PAIR status. You select the Swap&Freeze option through the Options button on the main BC window (see “Setting options” on [page 71](#)).

Make sure that the Swap&Freeze option remains in effect until the pair status changes to PAIR after the quick restore operation.

The table below lists operational requirements for the reverse and quick restore pairresync command.

| Reverse and Quick Restore Pairresync | |
|---|---|
| Command/Condition | Description |
| Reverse and quick restore pairresync | <p>Reverse and quick restore pairresync can only be performed on PSUS pairs. All other pairs which share the same P-VOL as the specified pair must be in either a PSUS or PSUE status.</p> <p>Reverse and quick restore pairresync cannot be performed on L2 cascaded pairs.</p> <p>When a split pair is resynchronized in reverse or quick restore mode, the disk array copies only the S-VOL differential data to the P-VOL. No update operations are performed during the reverse or quick restore pairresync operation.</p> <p>After reverse pairresync, ensure that the pair status changes to PAIR before performing a CA pairresync or the pair may be suspended.</p> <p>If the specified pair consists of a normal volume and a VLL volume, the quick restore command will be rejected.</p> |
| Reverse or quick restore pairresync issued to a shared BC/CA volume | <p>During the reverse or quick restore pairresync operation, a CA pair cannot be created. The CA paircreate command will be rejected when the BC pair status is COPY(RS-R).</p> <p>Reverse pairresync and quick restore operations cannot be performed on BC/CA shared volumes.</p> <p>If the BC P-VOL is also a CA P-VOL or S-VOL, and the CA pair is not in the PSUS or PSUE status, the reverse and quick restore pairresync will be rejected.</p> <p>If the BC S-VOL is also a CA P-VOL, and the CA pair is not in the PSUS or PSUE status, the reverse and quick restore pairresync will be rejected.</p> |

| Reverse and Quick Restore Pairresync | |
|---|---|
| Command/Condition | Description |
| Effect on other pairs which share the P-VOL | If the reverse or quick restore pairresync operation is performed on one BC pair in a 1-to-n BC configuration (n>1), the P-VOL and the other S-VOLs are no longer synchronized. While this reverse or quick restore pairresync is in progress, you cannot perform paircreate, pairsplit, or pairresync for any other pair which shares the same P-VOL (pairsplit-S and pairsplit-E are allowed). |
| Reverse or quick restore pairresync ends abnormally or Pairsplit-E (PSUE) is requested during reverse or quick restore resync | <p>If a reverse or quick restore pairresync ends abnormally, the pair status changes to PSUE.</p> <p>The P-VOL of the PSUE pair is read and write enabled for all hosts; however, the data on the P-VOL is not guaranteed. The S-VOL of the PSUE pair remains write-disabled (read-only); however, the data on the S-VOL is not guaranteed.</p> <p>The status of other BC pairs which share the same P-VOL does not change.</p> |

Pairsplit –E (suspend)

The Pairsplit –E command suspends BC copy operations to the S-VOL of the pair. A pair can be error-suspended (PSUE) at any time.

- When a pair is suspended, the status changes to PSUE.
- The disk array continues to write to the P-VOL, and marks the entire P-VOL track map as difference data.

If the disk array cannot maintain the PAIR status for any reason, or if you suspend the pair, the pair error status changes to PSUE.

The disk array will automatically suspend a pair under the following conditions:

- When it cannot keep the pair mirrored for any reason.
- When the disk array detects an error condition when the pair is in COPY(PD) status during paircreate. In this case, the disk array:
 - Aborts the initial copy operation.
 - Changes the status of the P-VOL and S-VOL to SMPL.
 - Accepts all subsequent write I/Os to the S-VOL.
 - Does not keep track of updates.
- When the disk array detects an error condition during pairresync.
- When the volume pair has been suspended (PSUE) or deleted (SMPL) from an open-system host using the RM CLI.
- When the P-VOL and/or S-VOL track map in shared memory is lost for COPY(SP) and PSUS(SP) pairs. (For PAIR, PSUS, or COPY(RS) pairs, the pair is not suspended but the entire P-VOL is marked as difference data.)

Pairsplit -S (delete)

Pairsplit -S deletes pairs by stopping disk array updates to the S-VOL of the pair and severing the relationship between the P-VOL and the S-VOL.

- You can delete a pair at any time except during the quick pairsplit operation, in other words, any status except SMPL and PSUS(SP).
- The volume status changes to SMPL after a pairsplit -S command.
- After deleting a pair, the S-VOL is not available to write to until you reset the reserve attribute.

Caution *The S-VOL of a PAIR status pair may not be identical to its P-VOL, due to the asynchronous nature of BC update copy. See “Pairresync (resynchronize)” on [page 17](#) for instructions on synchronizing the volumes before deleting the pair.*

Pair status

BC places volumes into various statuses depending on the command you use. To check pair status, use the Pairdisplay feature on the BC main window.

The table below describes the various BC pair statuses and the availability of the S-VOL for read/write I/Os. The P-VOL remains accessible for write I/Os except in the COPY(RS-R) status. The Pair Status column shows the status name that displays in BC.

| BC Pair Status Combinations | | |
|-----------------------------|---|--------------|
| Pair Status | Description | S-VOL Access |
| COPY(PD) | <i>(Copy in progress for initial paircreate)</i> The disk array stops accepting write operations for the S-VOL. No updates are performed at this time. | Read only |
| COPY(RS) | <i>(Copy resync in progress)</i> When pairresync is complete, the pair status changes to PAIR. The disk array does not perform updates during the pairresync operation. When a PSUS (split) pair is resynchronized in normal mode, the disk array copies only the P-VOL differential data to the S-VOL. When a PSUE (suspended due to error) pair is resynchronized, the disk array copies the entire P-VOL to the S-VOL. | Read only |

(continued)

| BC Pair Status Combinations | | |
|-----------------------------|--|--------------|
| Pair Status | Description | S-VOL Access |
| COPY(RS-R) | <p><i>(Copy in progress for reverse pairresync or quick restore)</i> The data is copied in the reverse direction from the S-VOL to P-VOL. The disk array does not accept write I/Os for the S-VOLs or the P-VOL.</p> <p>When reverse or quick restore are complete, the pair status changes to PAIR.</p> <p>See page 17 for more details on the reverse pairresync and quick restore commands.</p> | Read only |
| COPY(SP) | <i>(Copy in progress for pairsplit)</i> The status becomes COPY(SP) during pairsplit (steady split). All P-VOL updates prior to pairsplit are copied to the S-VOL in no order. When these updates are complete, the split S-VOL is identical to the state of the P-VOL when the split started. | Read only |
| PAIR | <p><i>(Volumes are paired)</i> Paircreate is complete, and the disk array starts performing updates from the P-VOL to the S-VOL as needed. The P-VOL and S-VOL in PAIR status may not be identical. The disk array rejects all write I/Os to any S-VOLs in a PAIR status.</p> <p>For reverse and quick restore pairresync: The status changes to PAIR after these processes are complete.</p> | Read only |
| PSUE | <p><i>(Suspended due to error)</i> The disk array continues accepting read and write I/Os for a PSUE (suspended) P-VOL, but does not perform update copy operations to a PSUE S-VOL. The disk array marks the entire P-VOL track map as difference data, so the entire P-VOL is copied to the S-VOL when the PSUE pair is resumed.</p> <p>Use the pairresync command to resume a PSUE pair.</p> <p>If you delete a PSUE pair, the pair status changes to SMPL.</p> | Read only |

(continued)

| BC Pair Status Combinations | | |
|-----------------------------|--|--|
| Pair Status | Description | S-VOL Access |
| PSUS | (<i>Pair split</i>) Pair status changes to PSUS after pairsplit to access (read or write) the split S-VOL. The disk array tracks all differential data, so that the pair can be resynchronized quickly. | Read and write; the S-VOL can be mounted |
| PSUS(SP) | (<i>Pair split by quick split or quick pairresync</i>) Pair status becomes PSUS(SP) after quick split (pairsplit) or quick pairresync. Only the P-VOL differential data is copied to the S-VOL. Quick split (pairsplit): The disk array accepts writes for PSUS(SP) S-VOLs. The PSUS(SP) pairs cannot be deleted. Quick pairresync: You can resynchronize PSUS and PSUE pairs using quick pairresync. The S-VOL is inaccessible to all hosts. The P-VOL and S-VOL resynchronize when the disk array update occurs. | Read and write; the S-VOL can be mounted |
| SMPL | (<i>Simplex; not a paired volume</i>) The volume is not assigned to a BC pair. The disk array accepts read and write I/Os for all volumes which are not reserved. Pairsplit -S (delete pair) changes the pair status of both P-VOL and S-VOL to SMPL. | Not Applicable (there is no S-VOL yet) |

How L1 pair status affects L2 operations

The table below shows the relationship between the L1 status and what commands you can use for L2 pairs. For example, when an L1 pair is PSUS you can perform any L2 operation except for a reverse/quick restore.

| | | L2 Pair Operations | | | | |
|-----------------------|-------------------|---------------------------|-------------------|-----------------------------------|---------------------|---------------------|
| L1 Pair Status | Paircreate | Pairsplit | Pairresync | Reverse/ Quick Restore | Pairsplit -E | Pairsplit -S |
| COPY(PD) | X | | X | | X | X |
| PAIR | X | | X | | X | X |
| COPY(SP) | X | | X | | X | X |
| PSUS(SP) | X | | X | | X | X |
| PSUS | X | X | X | | X | X |
| COPY(RS) | X | | X | | X | X |
| COPY(RS-R) | X | | X | | X | X |
| PSUE | X | | X | | X | X |

X = Command may be used.

Blank = Command is not allowed.

Writing to L1 pairs

The disk array can write data to L1 S-VOLs only when they are in PSUS or PSUS(SP) status.

How L2 pair status affects L1 operations

The table below indicates the relationship between the L2 status and what commands you can use for L1 pairs. For instance, only two L1 pair operations are allowed during a reverse copy (RS-R) from an S-VOL to a P/S-VOL in an L2 pair.

| | | L1 Pair Operations | | | | |
|-----------------------|-------------------|---------------------------|-------------------|---------------------------------------|---------------------|---------------------|
| L2 Pair Status | Paircreate | Pairsplit | Pairresync | Reverse/ Quick Restore | Pairsplit -E | Pairsplit -S |
| COPY(PD) | X* | X | X | X | X | X |
| PAIR | X* | X | X | X | X | X |
| COPY(SP) | | | | | X | X |
| PSUS(SP) | | | | | X | X |
| PSUS | X* | X | X | X | X | X |
| COPY(RS) | X* | X | X | X | X | X |
| COPY(RS-R) | | | | | X | X |
| PSUE | X* | X | X | X | X | X |

X = Command may be used.

Blank = Command is not allowed.

*The MU# of the L2 pair must be 1 or 2.

Writing to L2 pairs

The disk array can write data to L2 P-VOLs and S-VOLs only when they are in PSUS or PSUS(SP) status.

Using BC with CA

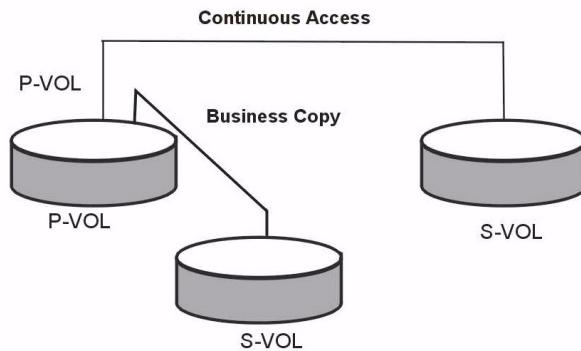
BC and CA can function in the same disk array to make multiple backup copies of volumes at both local and remote sites. You can use BC with CA using the different configurations described below.

In all configurations, the reverse pairresync command cannot be used when BC and CA are working together.

CA and BC P-VOL

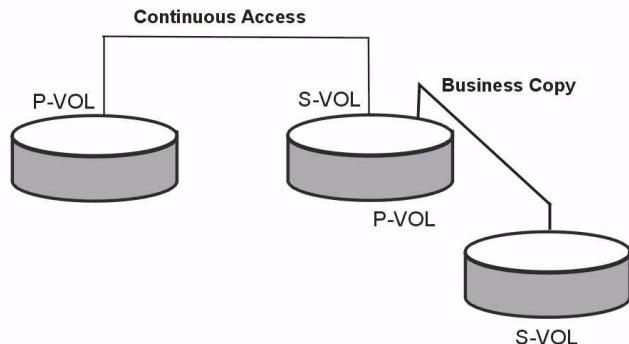
The figure below shows an example of a volume that is functioning as both a CA and a BC P-VOL. This configuration allows you to:

- Use BC to provide on-site backup copies of CA P-VOLs in a more timely manner than using the CA S-VOL.
- Use CA to provide remote backup copies of BC P-VOLs.



CA S-VOL and BC P-VOL

The figure below shows an example of a volume that is functioning as both a CA S-VOL and a BC P-VOL. This configuration allows you to use BC to provide remote (data consistent, point-in-time) copies of CA S-VOLS.

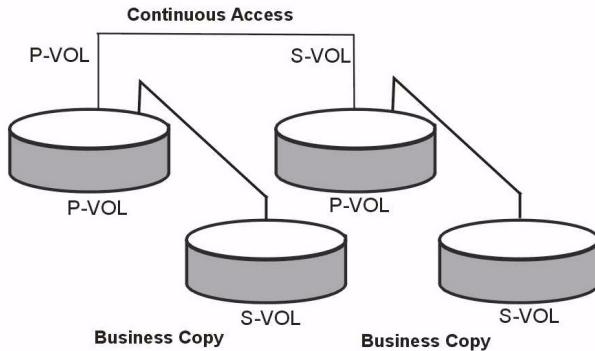


In this configuration, you cannot use either the reverse pairresync or quick restore commands.

CA and BC P-VOL with CA S-VOL as BC P-VOL for another pair

The figure below shows an example of a volume that is functioning as both a CA and a BC P-VOL, while the S-VOL of the same CA pair is also functioning as the P-VOL of another BC pair. This configuration allows you to:

- Use BC to provide on-site backup copies of CA P-VOLs and S-VOLs.
- Use CA to provide remote backup of CA P-VOLs.



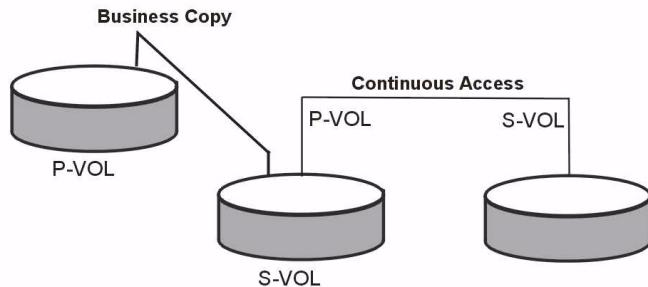
BC S-VOL and CA P-VOL

Caution

Using a BC S-VOL as a CA P-VOL is not recommended due to the functionality constraints necessary.

The figure below shows a volume that functions as both a BC S-VOL and a CA P-VOL. This configuration allows you to use CA to provide asynchronous remote copy.

This configuration does not allow BC and CA to copy at the same time. Create the BC pair first, and then split (PSUS) the BC pair before creating the CA pair. You must delete (SMPL) the CA pair to resync the BC pair which will require a full initial copy when the CA pair is recreated. The CA pair status cannot be changed when the BC pair is in the PSUS(SP) status.



Installation

This chapter describes BC system requirements, how to install BC, how to uninstall BC, and how to prepare for BC operations.

Requirements

The system requirements for BC are:

- **HP StorageWorks Disk Array (XP48, XP256, or XP512)**

If you are using more than one disk array data management feature (for example, Continuous Access (CA), custom volume size configuration (VSC), Cache LUN) at the same time in the same disk array, ensure that enough cache and shared memory is available. Your HP representative can help you determine how much to install.

- **RAID levels**

While BC supports different RAID combinations, ideally, P-VOLs and S-VOLs in a BC pair should use the same RAID level and the same speed disk drives (for example, RAID-5 and 10k rpm disks).

- **Logical devices (LDEVs)**

OPEN-3/8/9/E, including custom-size devices. Devices must be installed and configured. The P-VOL and S-VOL must be the same type (for example, OPEN-3 to OPEN-3 is allowed, OPEN-3 to OPEN-9 is not allowed). A custom-size P-VOL must be paired with S-VOLs of the same type and size. For more information on supported device types, contact your HP representative.

- **HP StorageWorks Remote Control XP (RC) installed on the remote console PC**

- **Administrator access to Remote Control to perform BC operations**

- **Business Copy firmware option**

Your HP service representative must install the BC firmware option on the disk array before you install the license keys. For more information about installing option firmware license keys, see the Remote Control XP product documentation.

- **BC XP license key**

- **(Recommended) HP StorageWorks LUN Configuration Manager XP**

Integrating BC with VERITAS NetBackup DataCenter

You can integrate BC with VERITAS NetBackup DataCenter to provide:

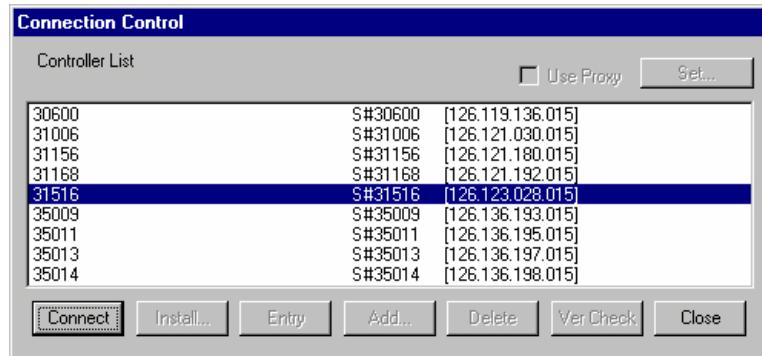
- Automated point-in-time copy capabilities
- Transparent, non-disruptive backups
- Centralized management of backups
- Multi-tiered architecture for managing growing backup requirements
- Centralized and automated “split mirror” and “zero downtime” backups.

This integration provides automated control of server-free data movement and allows a point-in-time volume copy to be split and backed up directly from disk to tape, and then resynchronized with a P-VOL. For more information, contact your HP representative.

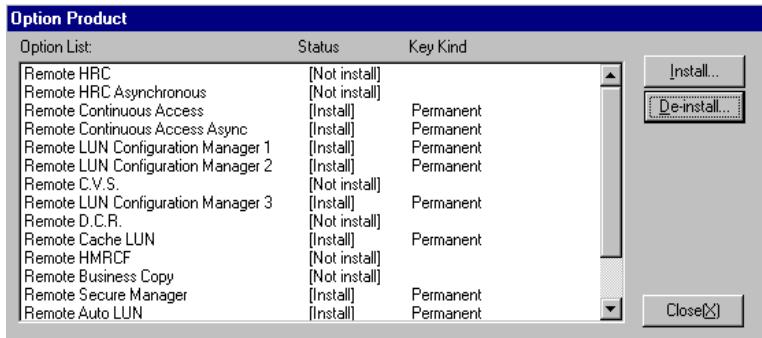
Installing

Your HP representative initially installs the BC firmware license keys. You then install the corresponding remote license keys from the remote console PC.

1. Log in as an administrator.
2. On the Remote Control main window, click **Controller**. A list of disk arrays displays.



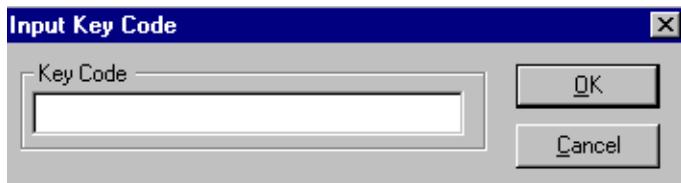
3. Select the disk array that you want to install the key for, and click **Install**. The Option Product window opens.



This window shows the current installation status of the Remote Control options.

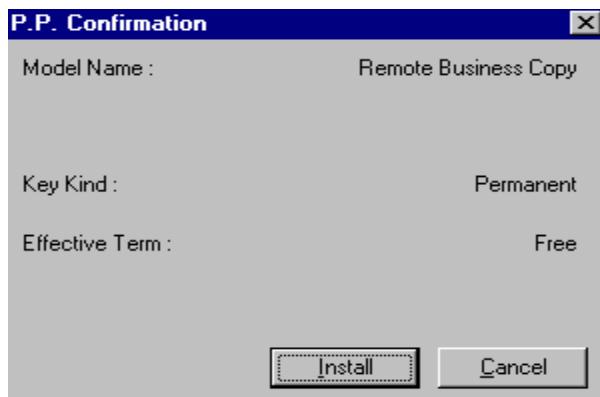
4. Select **Remote Business Copy** from the Option List.

5. Click the **Install** button. The Input Key Code window opens.
6. Enter the license key in the Key Code text box.



7. Click **OK**.

If the password is approved, the Program Product window opens. This window shows the product name, model name (for example, P-242R-E4241), key type (for example, Permanent), and effective term (for example, Free).



8. After confirming the content of the Program Product window, click **OK**.
When this option installation is complete, the Option Product window opens. The status of the selected option changes from [Not install] to [Install].
9. Click **Close** to return to the Remote Control main window.

Uninstalling

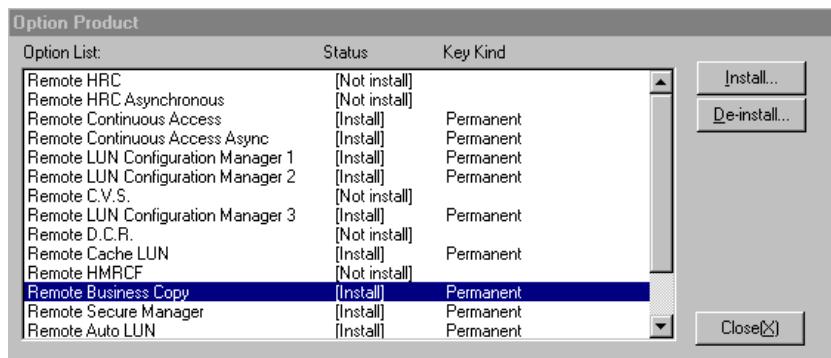
Uninstalling BC is the same for any type of disk array.

1. Log in to Remote Control XP as an administrator.

The Remote Control main window opens.

2. Click **Option**.

The Option Product window opens showing the current installation status of the RC options.



3. Click the **Remote Business Copy** option from the list.

4. Click **De-install**.

The Option Product window changes the status of Remote BC from [Install] to [Not install]. The BC option is now uninstalled.

5. Click **Close** to return to the Remote Control main window.

Preparing for operations

To prepare for BC operations, perform the following tasks:

- **Consider the relative importance of the disk array's host I/O performance versus the performance of the BC backup copies.**

BC operations affect the I/O (input/output) performance of the disk array because of the additional write operations to S-VOLs. For example, assigning three S-VOLs to each P-VOL takes more array resources than assigning only one or two. You can also use the BC pace option to reduce the impact of copy operations. A slower copy pace minimizes the impact of BC operations on I/O performance, while a faster copy pace produces point-in-time copies more quickly but can affect host I/O performance. Paircreate is performed only once to each S-VOL, unless the S-VOL becomes *suspended* (PSUE).

- **Identify the volumes (LUNs) you will be using for BC operations.**

For each volume, write down the full SCSI path (port, target ID (TID), LUN), whether the volume will be a P-VOL or S-VOL, and the other volumes to which it is paired. The LUN Manager HP StorageWorks Remote Control XP (RC) displays this information. The volumes that will be BC P-VOLs will usually remain fully accessible to all hosts throughout all BC operations, but the volumes that will be BC S-VOLs will need to be unmounted before being reserved for BC operations.

Sample Table for BC Configurations

| CU # | Port ID | SCSI Path (TID:LUN) | P-VOL? | Associated S-VOLs | S-VOL? | Associated P-VOL |
|--------------|---------|---------------------|--------|-------------------|--------|------------------|
| 0 | 1A | 0:00 | Yes | 1B-0:00, 2A-0:00 | No | -- |
| 0 | 1A | 0:01 | Yes | 1B-0:01, 2A-0:01 | No | -- |
| And so forth | | | | | | |
| 0 | 1B | 0:00 | No | -- | Yes | 1A-0:00 |
| 0 | 1B | 0:01 | No | -- | Yes | 1A-0:01 |
| And so forth | | | | | | |

- **Disperse RAID group workloads**

Business Copy P-VOLs or S-VOLs should not be concentrated in the same RAID group. To disperse workloads of the RAID groups, each RAID group should have both P-VOLs and S-VOLs evenly distributed. Business Copy pairs for which a Business Copy operation is performed simultaneously should be in different RAID groups. If Business Copy pairs are concentrated in only a few RAID groups, the host I/O performance may be degraded.

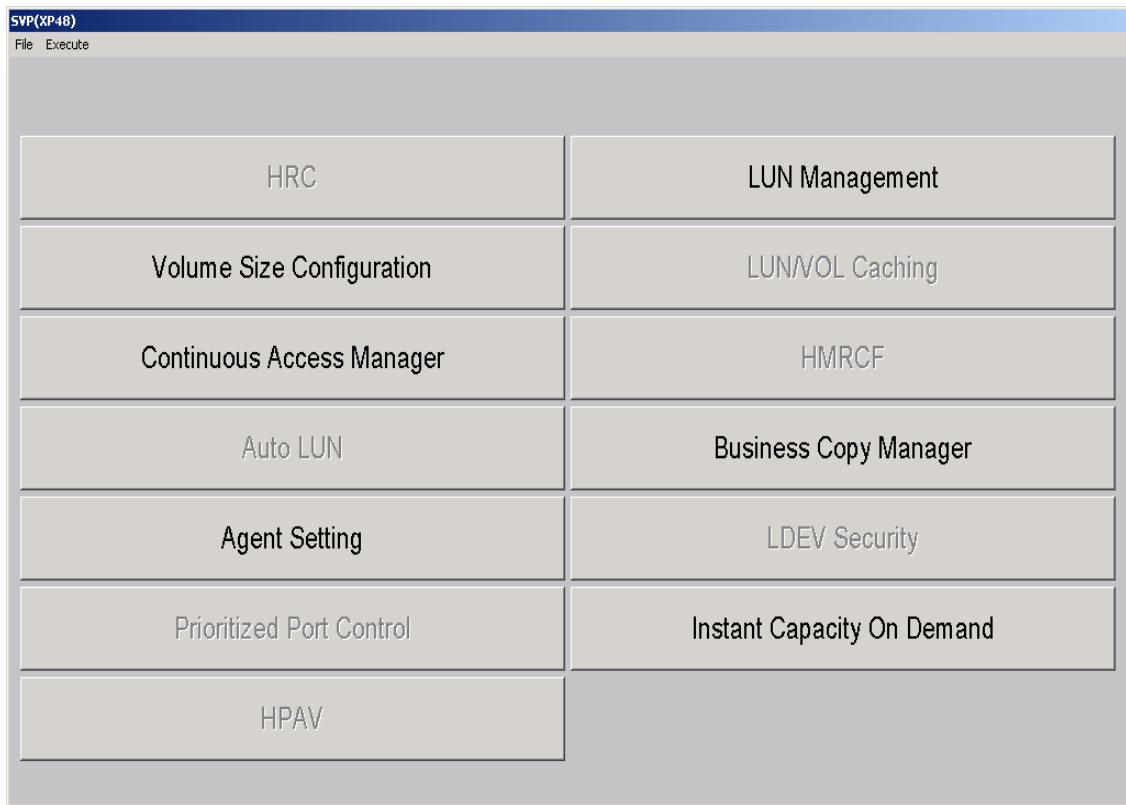
3

Operations

This chapter describes how to start BC operations and how to perform each operation.

Starting operations

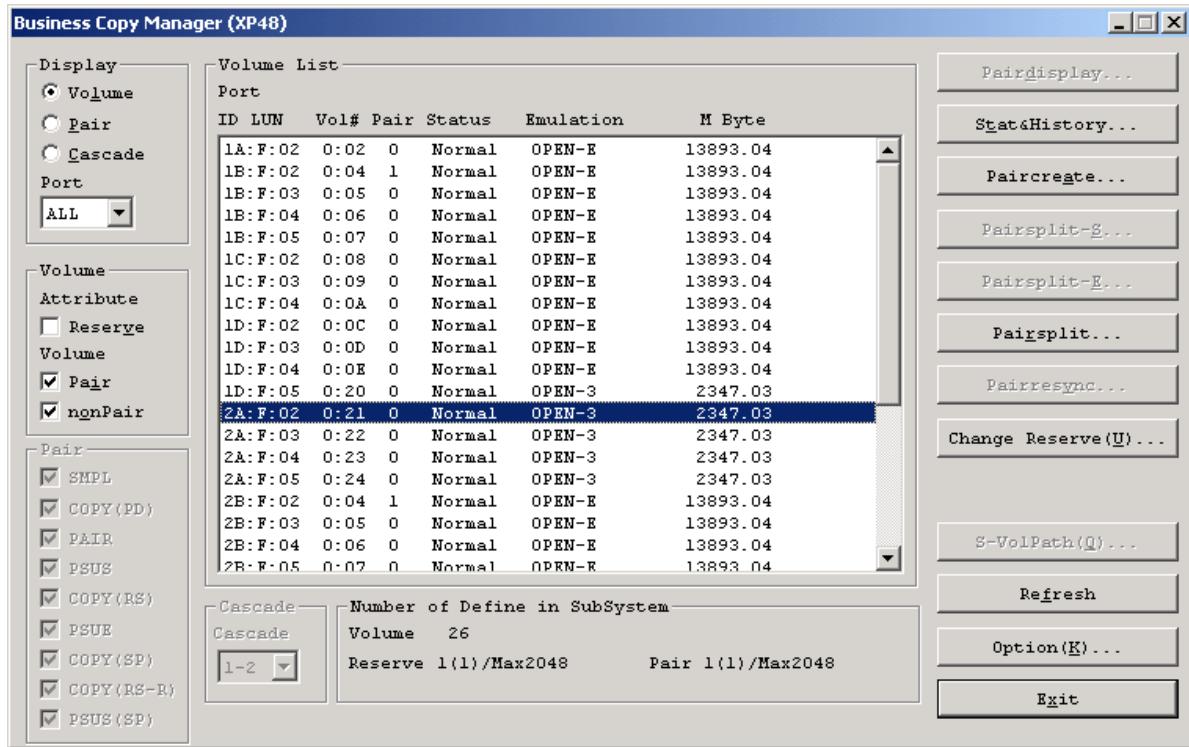
1. Start and log in to Remote Control with administrator access privileges.
2. Connect to the disk array on which you will perform BC operations. The Remote Control screen displays.



3. Click **Business Copy Manager** to open the BC main window.

Main window

The BC main window displays the name of the connected disk array, the ID of the currently selected port, and all of the volumes (LUNs) installed on the current port.



The **Display** box allows you to select a display mode for the **Volume List**.

| | |
|----------------|--|
| Volume | Displays volumes in the Volume List . |
| Pair | Displays pair information in the Volume List . |
| Cascade | Displays cascaded pair information in the Volume List . |
| Port | Selects which port to display, including ALL ports. |

The **Volume** box allows you to display information by reserve attribute and by pair condition

Attribute/Reserve

check box Displays all reserved volumes when checked.

**Volume/Pair and
Volume/nonPair**

check boxes Displays paired and/or nonpaired volumes.

Pair box

The **Pair** box allows you to filter the pairs displayed in the **Volume List** box by pair status. It is enabled only when the Pair display mode is selected in the **Display** box. Select the types of pair status you want to display by checking the boxes.

SMPL Displays non-paired volumes.

COPY(PD) Displays volumes in the process of being paired (copied).

PAIR Displays paired volumes

PSUS Displays split pairs

COPY(RS) Displays pairs in pairresync status (P-VOL to S-VOL).

PSUE Displays suspended volumes.

COPY(SP) Displays split pairs.

COPY(RS-R) Displays pairs in reverse pairresync status (S-VOL to P-VOL).

PSUS(SP) Displays pairs with quick resync or quick split commands underway.

Cascade box

Enabled only when Cascade display mode is selected. Allows you to filter the pairs displayed in the **Volume List** box by cascade level:

- 1** Displays L1 pairs only.
- 1–2** Displays L1 and L2 pairs.

The **Number of Define in Subsystem** (disk array) box displays:

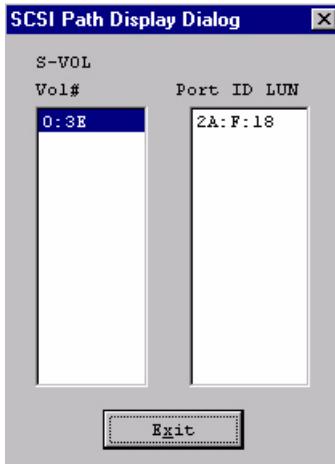
- Volume** The total number of volumes defined in the disk array.
- Reserve** $X(Y)/MaxZ$, where:
 - X = number of BC reserved volumes.
 - Y = total number of BC reserved volumes.
 - Z = maximum allowable number of reserved volumes.
- Pair** $X(Y)/MaxZ$, where:
 - X = number of open systems BC pairs.
 - Y = total number of BC pairs.
 - Z = maximum allowable number of pairs.

Use the buttons on the right side of the BC main window for the following actions:

- Pairdisplay** Displays the pair status for the selected volume pair.
- Stat&History** Displays the pair status and history for the selected volume pair.
- Paircreate** Adds volume pairs (PAIR).
- Pairsplit –S** Deletes volume pairs (SMPL).
- Pairsplit –E** Suspends volume pairs (PSUE).
- Pairsplit** Splits volume pairs (PSUS).
- Pairresync** Resyncs volume pairs.

Change Reserve Reserves and unreserves volumes.

S-VolPath Displays the S-VOL SCSI paths for the selected pairs.



Refresh Updates the information on the BC main window.

Option Displays the option display window.

Exit Exits BC and returns you to the Remote Control main window.

Volume List box

The Volume List box shows volume/pair information based on the filter options you select in the **Display**, **Volume**, and **Pair** boxes.

Volume display mode

When you select **Display/Volume**, the **Volume List** box shows all installed volumes on the selected port and displays information for each volume.

| <input checked="" type="radio"/> Volume <input type="radio"/> Pair <input type="radio"/> Cascade Port <input type="button" value="ALL"/> | | Volume List Port <table border="1"> <thead> <tr> <th>ID</th> <th>LUN</th> <th>Vol#</th> <th>Pair</th> <th>Status</th> <th>Emulation</th> <th>M Byte</th> </tr> </thead> <tbody> <tr><td>1A:F:02</td><td>0:02</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1B:F:02</td><td>0:04</td><td>1</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1B:F:03</td><td>0:05</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1B:F:04</td><td>0:06</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1B:F:05</td><td>0:07</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1C:F:02</td><td>0:08</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1C:F:03</td><td>0:09</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1C:F:04</td><td>0:0A</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1D:F:02</td><td>0:0C</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1D:F:03</td><td>0:0D</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1D:F:04</td><td>0:0E</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>1D:F:05</td><td>0:20</td><td>0</td><td>Normal</td><td>OPEN-3</td><td>2347.03</td></tr> <tr><td>2A:F:02</td><td>0:21</td><td>1</td><td>Normal</td><td>OPEN-3</td><td>2347.03</td></tr> <tr><td>2A:F:03</td><td>0:22</td><td>0</td><td>Normal</td><td>OPEN-3</td><td>2347.03</td></tr> <tr><td>2A:F:04</td><td>0:23</td><td>0</td><td>Normal</td><td>OPEN-3</td><td>2347.03</td></tr> <tr><td>2A:F:05</td><td>0:24</td><td>0</td><td>Normal</td><td>OPEN-3</td><td>2347.03</td></tr> <tr><td>2B:F:02</td><td>0:04</td><td>1</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>2B:F:03</td><td>0:05</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>2B:F:04</td><td>0:06</td><td>0</td><td>Normal</td><td>OPEN-E</td><td>13893.04</td></tr> <tr><td>2B:F:05</td><td>0:07</td><td>0</td><td>Normal</td><td>OPEN-R</td><td>13893.04</td></tr> </tbody> </table> | | | | | | | ID | LUN | Vol# | Pair | Status | Emulation | M Byte | 1A:F:02 | 0:02 | 0 | Normal | OPEN-E | 13893.04 | 1B:F:02 | 0:04 | 1 | Normal | OPEN-E | 13893.04 | 1B:F:03 | 0:05 | 0 | Normal | OPEN-E | 13893.04 | 1B:F:04 | 0:06 | 0 | Normal | OPEN-E | 13893.04 | 1B:F:05 | 0:07 | 0 | Normal | OPEN-E | 13893.04 | 1C:F:02 | 0:08 | 0 | Normal | OPEN-E | 13893.04 | 1C:F:03 | 0:09 | 0 | Normal | OPEN-E | 13893.04 | 1C:F:04 | 0:0A | 0 | Normal | OPEN-E | 13893.04 | 1D:F:02 | 0:0C | 0 | Normal | OPEN-E | 13893.04 | 1D:F:03 | 0:0D | 0 | Normal | OPEN-E | 13893.04 | 1D:F:04 | 0:0E | 0 | Normal | OPEN-E | 13893.04 | 1D:F:05 | 0:20 | 0 | Normal | OPEN-3 | 2347.03 | 2A:F:02 | 0:21 | 1 | Normal | OPEN-3 | 2347.03 | 2A:F:03 | 0:22 | 0 | Normal | OPEN-3 | 2347.03 | 2A:F:04 | 0:23 | 0 | Normal | OPEN-3 | 2347.03 | 2A:F:05 | 0:24 | 0 | Normal | OPEN-3 | 2347.03 | 2B:F:02 | 0:04 | 1 | Normal | OPEN-E | 13893.04 | 2B:F:03 | 0:05 | 0 | Normal | OPEN-E | 13893.04 | 2B:F:04 | 0:06 | 0 | Normal | OPEN-E | 13893.04 | 2B:F:05 | 0:07 | 0 | Normal | OPEN-R | 13893.04 |
|--|------|--|--------|--------|-----------|--------|--|--|----|-----|------|------|--------|-----------|--------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|---------|---------|------|---|--------|--------|---------|---------|------|---|--------|--------|---------|---------|------|---|--------|--------|---------|---------|------|---|--------|--------|---------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|---------|------|---|--------|--------|----------|
| ID | LUN | Vol# | Pair | Status | Emulation | M Byte | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1A:F:02 | 0:02 | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1B:F:02 | 0:04 | 1 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1B:F:03 | 0:05 | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1B:F:04 | 0:06 | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1B:F:05 | 0:07 | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1C:F:02 | 0:08 | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1C:F:03 | 0:09 | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1C:F:04 | 0:0A | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1D:F:02 | 0:0C | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1D:F:03 | 0:0D | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1D:F:04 | 0:0E | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1D:F:05 | 0:20 | 0 | Normal | OPEN-3 | 2347.03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2A:F:02 | 0:21 | 1 | Normal | OPEN-3 | 2347.03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2A:F:03 | 0:22 | 0 | Normal | OPEN-3 | 2347.03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2A:F:04 | 0:23 | 0 | Normal | OPEN-3 | 2347.03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2A:F:05 | 0:24 | 0 | Normal | OPEN-3 | 2347.03 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2B:F:02 | 0:04 | 1 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2B:F:03 | 0:05 | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2B:F:04 | 0:06 | 0 | Normal | OPEN-E | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2B:F:05 | 0:07 | 0 | Normal | OPEN-R | 13893.04 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cascade <input type="button" value="Cascade"/> <input type="button" value="1-2"/> | | Number of Define in SubSystem Cascade Volume 26 Reserve 2(2)/Max2048 Pair 2(2)/Max2048 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Port ID

The port ID cluster and channel number of each volume.

LUN

The TID:LUN (target ID:LU number) of each volume.

Vol#

The CU:LDEV (control unit image:logical device ID) of each volume.

Pair

The number of BC pairs formed with the volume.

Status

Volume status: normal, blocked, format, correct, copying, or unknown.

Emulation

The device emulation type (for example, OPEN-3).

M Byte

The storage capacity of the volume in megabytes.

Pair display mode

When you select **Display/Pair**, the **Volume List** box displays all paired volumes.

| Volume List | | | | | | |
|-------------|--|---------|------|------|--------|--------|
| Port | | ID | LUN | Vol# | Pair | Status |
| | | ID | LUN | Vol# | Pair | Status |
| | | 1A:F:02 | 0:02 | 0 | Normal | OPEN-E |
| | | 1B:F:02 | 0:04 | 1 | Normal | OPEN-E |
| | | 1B:F:03 | 0:05 | 0 | Normal | OPEN-E |
| | | 1B:F:04 | 0:06 | 0 | Normal | OPEN-E |
| | | 1B:F:05 | 0:07 | 0 | Normal | OPEN-E |
| | | 1C:F:02 | 0:08 | 0 | Normal | OPEN-E |
| | | 1C:F:03 | 0:09 | 0 | Normal | OPEN-E |
| | | 1C:F:04 | 0:0A | 0 | Normal | OPEN-E |
| | | 1D:F:02 | 0:0C | 0 | Normal | OPEN-E |
| | | 1D:F:03 | 0:0D | 0 | Normal | OPEN-E |
| | | 1D:F:04 | 0:0E | 0 | Normal | OPEN-E |
| | | 1D:F:05 | 0:20 | 0 | Normal | OPEN-3 |
| | | 2A:F:02 | 0:21 | 1 | Normal | OPEN-3 |
| | | 2A:F:03 | 0:22 | 0 | Normal | OPEN-3 |
| | | 2A:F:04 | 0:23 | 0 | Normal | OPEN-3 |
| | | 2A:F:05 | 0:24 | 0 | Normal | OPEN-3 |
| | | 2B:F:02 | 0:04 | 1 | Normal | OPEN-E |
| | | 2B:F:03 | 0:05 | 0 | Normal | OPEN-E |

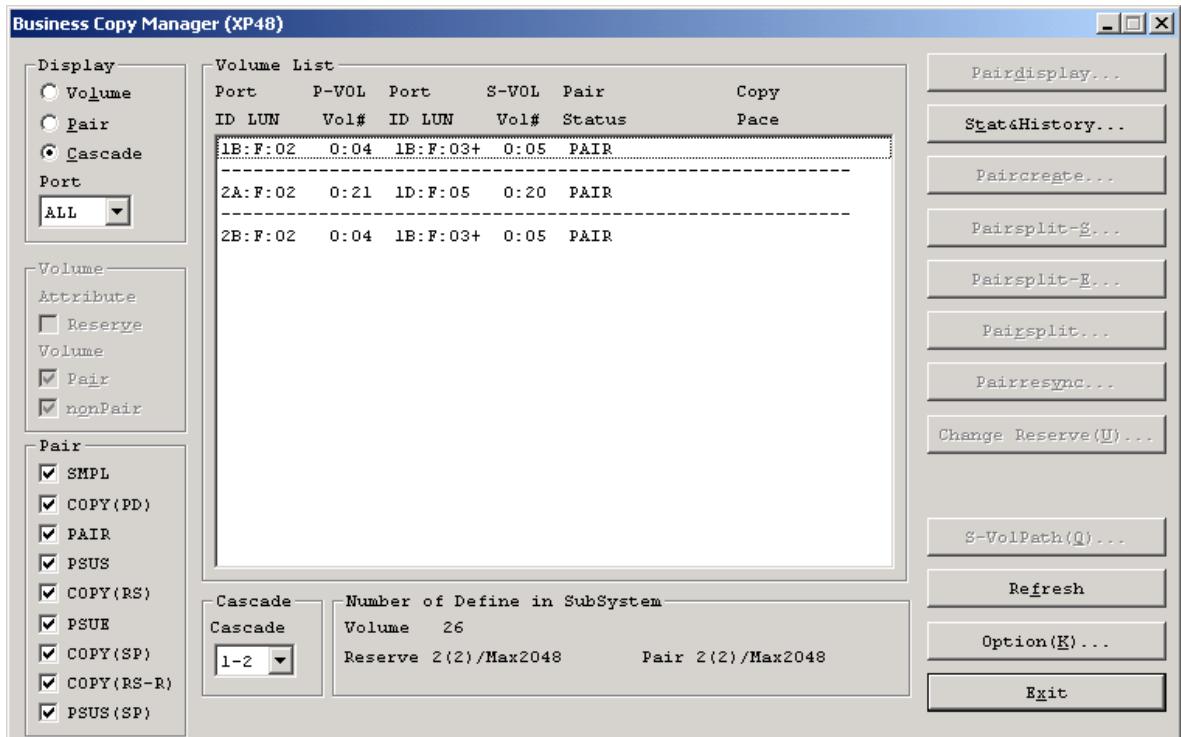
P-VOL The P-VOL ID, LUN, Vol#, and volume status.

S-VOL The P-VOL ID, LUN, Vol#, and volume status.

Pair Status The volume pair status of the volume pair.

Cascade display mode

When you select **Display/Cascade** the **Volume List** displays cascaded volumes.



P-VOL The P-VOL ID, LUN, Vol#, and volume status.

S-VOL The P-VOL ID, LUN, Vol#, and volume status.

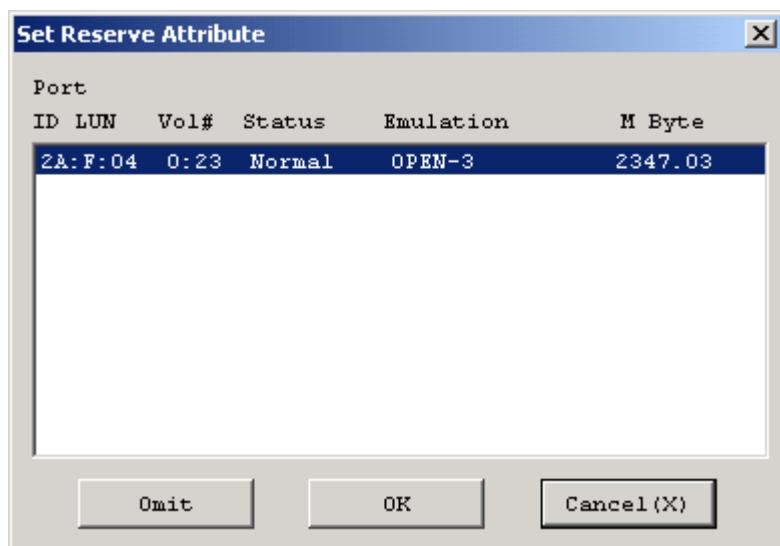
Pair Status The volume pair status of the volume pair.

Copy Pace Displays the copy pace for each pair.

Reserving volumes

Use the Set Reserve Attribute window to reserve volumes that you selected on the BC main window. The disk array rejects all write I/Os to reserved volumes.

1. Unmount any volumes you will be reserving.
2. On the BC main window, check **Volume** in the **Display** box to display volumes.
3. To display unreserved (SMPL) volumes, set the following in the Volume box:
 - Uncheck **Attribute/Reserve**.
 - Check **Volume/nonPair**.
 - Uncheck **Volume/Pair**.
4. In the Pair box, check the **SMPL** box.
5. Select the volumes from the Volume List you want to reserve, and click **Change Reserve** to open the Set Reserve Attribute window.



Verify that the Set Reserve Attribute window displays the volumes you selected. If you want to remove any volumes from the list, select the volumes, and click **Omit**.

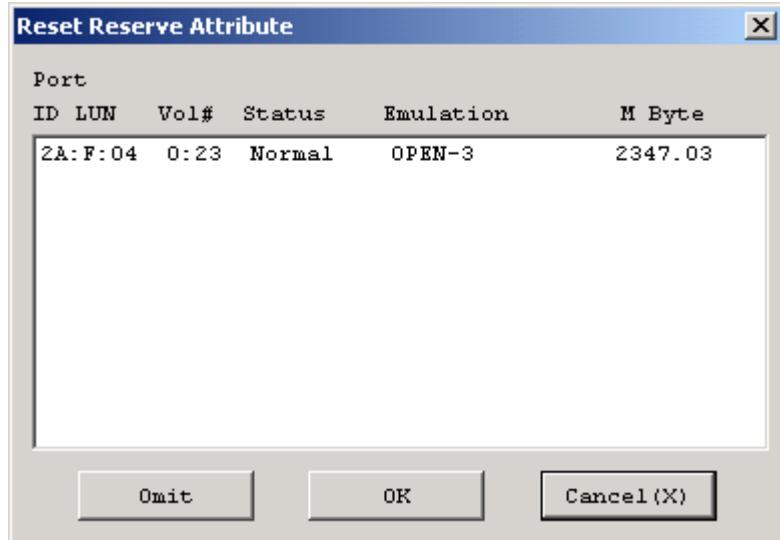
6. If the volumes displayed are the volumes you want to reserve, click **OK**.
7. BC displays a warning message reminding you to unmount the specified volumes. Click **OK** to continue, or click **Cancel** to cancel your request to reserve the volumes.

When the reserve is complete, the program returns you to the BC main window.

Unreserving volumes

Use the Reset Reserve Attribute window to reset (unreserve) volumes that you selected on the BC main window.

1. Ensure that the volumes you want to unreserve are no longer assigned to volume pairs as S-VOLs.
2. On the BC main window, check **Volume** in the **Display** box.
3. To display reserved (SMPL) volumes, set the following in the Volume box:
 - Check **Attribute/Reserve**.
 - Check **Volume/nonPair**.
 - Uncheck **Volume/Pair**.
4. In the Pair box, check the **SMPL** box.
5. Select the volumes you want to unreserve, and click **Change Reserve** to open the Reset Reserve Attribute window.



Verify that the Reset Reserve Attribute window displays the volumes you want to unreserve. There is no confirmation message. If you want

to remove any volumes from the list, select the volumes, and click **Omit**.

6. If the list is correct, click **OK**.

When the reset is complete, the program returns you to the BC main window.

Creating pairs

The Paircreate Dialog window allows you to select the S-VOLs for each P-VOL, set the copy pace option for pairs being added, and start the paircreate process. It displays the P-VOL and S-VOL information for each pair being added.

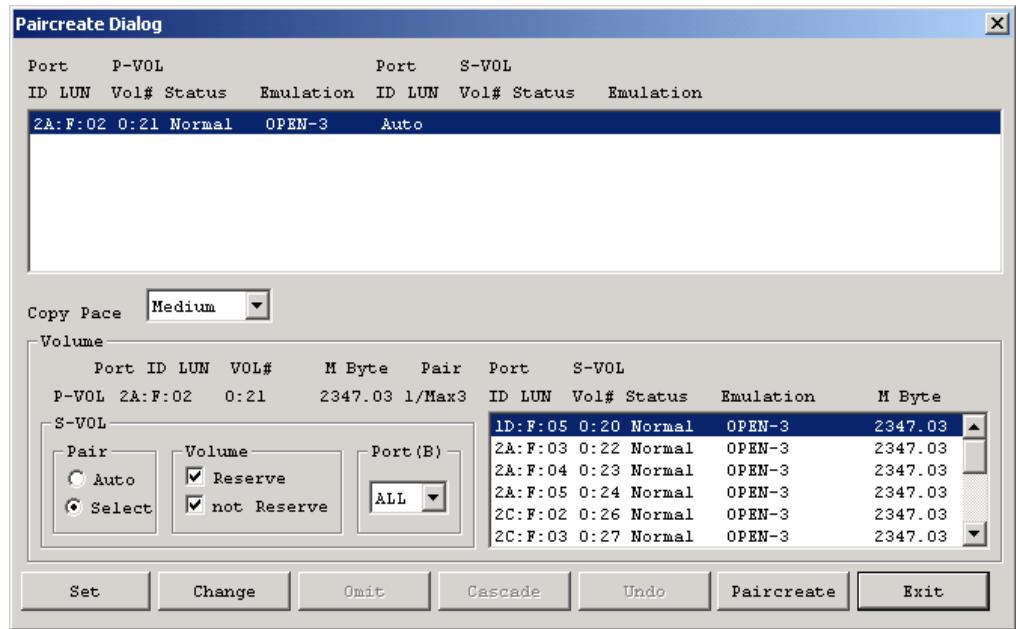
If you want to add new volume pairs and split them immediately so that you can access the S-VOLs as soon as possible, use pairsplit instead of paircreate to establish and split new pairs at the same time. See “Adding and splitting one or more new volume pairs at the same time” [\(page 63\)](#).

Adding one or more volume pairs

Caution

Paircreate overwrites all existing data on the S-VOLs. Back up the data on the S-VOLs before adding them to volume pairs.

1. Make sure that the S-VOLs you want to add are unmounted and reserved. See “Reserving volumes” [\(page 48\)](#).
2. On the BC main window, check **Volume** in the **Display** box and select the port from the Port drop-down box.
3. Display unreserved (SMPL) P-VOLs by setting the following in the **Volume** box:
 - Uncheck **Attribute/Reserve**.
 - Check **Volume/nonPair**.
 - Uncheck **Volume/Pair**.
4. In the Pair box, check the **SMPL** box.
5. Select the P-VOLs for the new pairs and click **Paircreate** to open the Paircreate Dialog window.



6. In the **Copy Pace** drop-down box, set the initial copy pace for all pairs being added:

Slower (one track at a time).

Medium (three tracks at a time).

Faster (fifteen tracks at a time).

The slower pace minimizes the impact on disk array I/O performance, while the faster pace completes the initial copy as quickly as possible.

7. Verify that the **Paircreate Dialog** window displays the P-VOLs you selected on the BC main window.

If you want to remove any volumes from the list, select the volumes, and click **Omit**.

8. Select the P-VOL to which you are assigning an S-VOL.

To assign an S-VOL automatically, click **Auto** in the S-VOL/Pair box. The disk array selects the S-VOL from the set of reserved volumes by LDEV ID (in order, lowest to highest).

To assign an S-VOL manually, click **Select** in the S-VOL/Pair box, click **Reserve** in the S-VOL/Volume box, select the port, and select the S-VOL from the list.

9. Click **Set** to add the S-VOL to the selected P-VOL. The S-VOL displays next to the selected P-VOL.
10. If you want to add a second or third S-VOL to the same P-VOL, repeat steps 7 and 9. Each pair to be added displays on a separate line in the list of pairs on the Paircreate Dialog window.

If you want to change an S-VOL for a pair which is already set, select the pair, select the S-VOL to replace the existing S-VOL, and click **Change**.

Click **Omit** to remove pairs.

Click **Undo** to reverse a Set or Change.

11. When the **Paircreate Dialog** window displays the new pairs, click **Paircreate** to add all pairs in the list.

12. When the confirmation window appears:

Click **Yes** to add the pairs.

Click **No** to cancel your request and return to the BC main window.

Click **Cancel** to cancel your request and return to the Paircreate Dialog window.

13. Click **OK** to return to the BC main window.

When the initial copy starts, the Pairdisplay window opens automatically to show the new pairs with COPY(PD) status. When the copying is complete the pair status becomes PAIR.

Creating one or more new L2 cascaded pairs

Caution *The L2 paircreate overwrites all existing data on the L2 S-VOLs. You must back up the data on the S-VOLs before creating BC pairs.*

1. Make sure that the L2 S-VOLs are unmounted and reserved. See “Reserving volumes” [\(page 48\)](#).
2. On the BC main window, select the L1 pair(s) to which you want to add the L2 pair(s)
3. Click **Paircreate** to open the Paircreate Dialog window.
4. On the Paircreate window:
 - Select the L1 pair.
 - Select the S-VOL for the new L2 pair.
 - Click **Cascade** to add the L2 pair to the list of pairs.
 - The L2 pair then displays on a separate line showing the L1 S-VOL as the L2 P-VOL.
5. Repeat step 4 until all L2 pairs are displayed.
 - Click **Change** to replace an S-VOL.
 - Click **Set** to add an S-VOL.
 - Click **Omit** to remove pairs.
6. When the Paircreate Dialog window displays all new pairs, click **Paircreate** to create all pairs in the list.
7. When the confirmation window appears:
 - Click **Yes** to create the pair(s).
 - Click **No** to cancel your request and return to the BC main window.
 - Click **Cancel** to cancel your request and return to the Paircreate Dialog window.

Viewing pair status

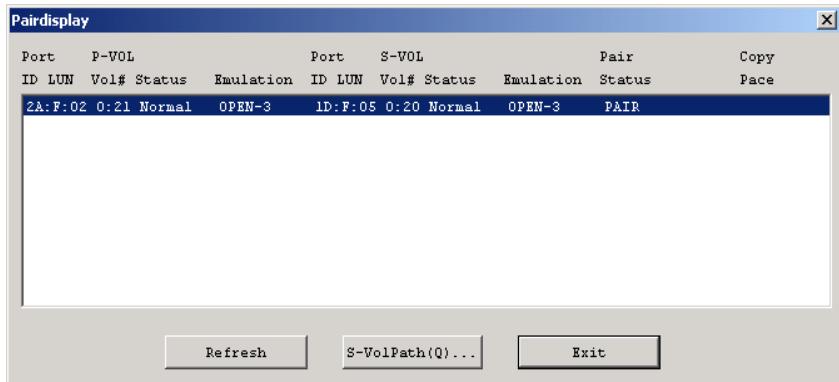
The Pairdisplay window displays the status information for the pairs selected on the BC main window. The Pairdisplay window also opens automatically when you add, split, resynchronize, and delete (Pairsplit –S) pairs.

1. On the BC main window:

Check **Volume** or **Pair** in the Display box and select the port.

Check the pair display options (**Pair** or **nonPair**) in the Volume box.

2. Select the volumes/pairs in the Volume List box, and click **Pairdisplay** to open the Pairdisplay window. Do not select any SMPL volumes.



The window shows:

P-VOL and S-VOL ID (port, ID, LUN, VOL#) and volume status.

Pair Status: SMPL, COPY(PD), PAIR, COPY(SP), PSUS, PSUS(SP), COPY(RS), COPY(RS-R), PSUE.

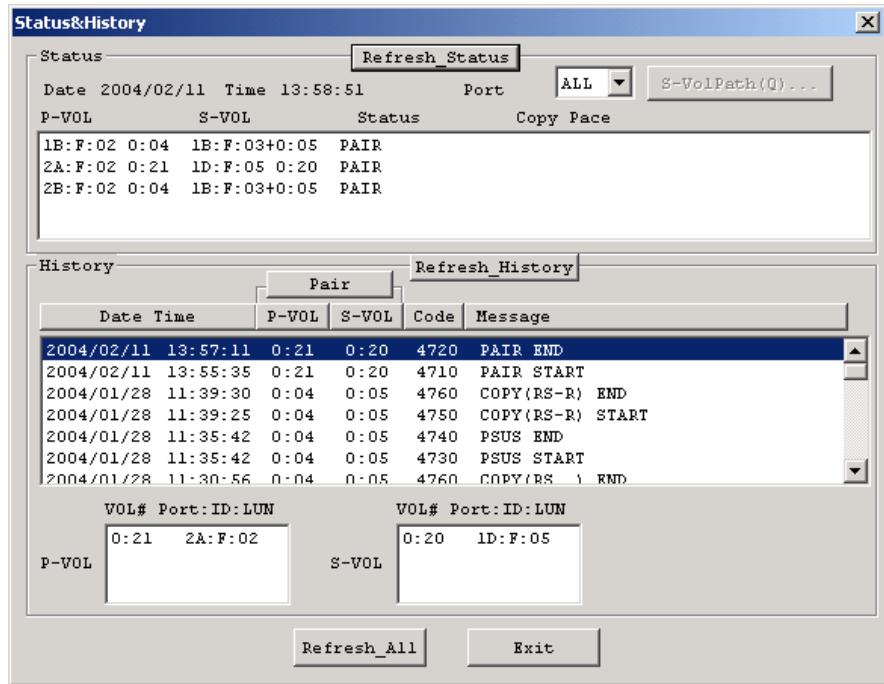
Copy Pace: Slower, Medium, or Faster. (Displayed when Pairdisplay is COPY(PD), COPY(SP), COPY(RS), or COPY(RS-R)).

3. Click **Refresh** as needed to update the information displayed on the Pairdisplay window. Click **S-VOL Path** as needed to view S-VOL SCSI paths.
4. When you are finished monitoring the status of the selected volumes/pairs, click **Exit** to return to the BC main window.

Viewing pair status and history

The Status & History window displays current volume pair status information as well as volume pair history information for the selected port.

To open, click **Stat&History** on the BC main window.



The **Status** box displays the following pair status information:

All volume pairs P-VOL ID, S-VOL ID, pair status, copy pace.

Date and Time When the information was acquired (window opened/refreshed).

Refresh Status Updates the information in the Status box.

S-VOL Path Displays S-VOL SCSI paths for the selected pairs.

The **History** box displays the following information for the selected port:

- Volume pair activity listed by date and time, P-VOL and S-VOL ID (CU:LDEV), BC code and message.

The **Date Time** button sorts the list by date and time.

The **P-VOL** and **S-VOL** buttons sort the list by P-VOL or S-VOL.

The **Code** button sorts by code number.

The **Message** button sorts according to message type. See the table below.

- All volumes currently being used as P-VOLs.
- All volumes currently being used as S-VOLs.

The Status & History window also provides the following functions:

Refresh History Refreshes the pair history information for the port.

Refresh All Updates all information on the Status & History window.

Exit Exits the Status & History window and returns you to the BC main window.

Business Copy XP Status & History Reference Codes and Messages

| Code | Message | Description |
|-------------|----------------|---|
| 4710 - 471F | PAIR START | The initial copy (paircreate) started. |
| 4720 - 472F | DUPLEX END | The initial copy (paircreate) ended, and the pair status changed to PAIR. |
| 4730 - 473F | SPLIT START | The split (pairsplit) started, and the pair status changed to COPY(SP) or PSUS(SP). |
| 4740 - 474F | SPLIT END | The split (pairsplit) ended, and the pair status changed to PSUS. |

Continued

| Business Copy XP Status & History Reference Codes and Messages | | |
|---|------------------------------------|--|
| Code | Message | Description |
| 4750 - 475F | RESYNC START | The resync (pairresync) started, and the pair status changed to COPY(RS). |
| 4760 - 476F | RESYNC END | The resync (pairresync) ended, and the pair status changed to PAIR. |
| 4780 - 478F | PAIR DELETE | The delete (pairsplit -E) was performed, and the pair status changed to SMPL. |
| 4790 - 479F | PAIR SUSPEND | The suspend (pairsplit -S) was performed, and the pair status changed to PSUE. |
| 47E7 | ALL SP-PEND SUSPEND BY SM VOLATILE | All pairs in COPY(SP) status were suspended, because the track maps in shared memory (SM) were lost. |
| 47A0 - 47AF | COPY WARNING END | A copy ended with a warning. |
| 47D0 - 47DF | COPY ABNORMAL END | A copy ended abnormally (reason other than above). |
| 47E7 | COMPULSION PAIR SUSPEND | A pair was suspended compulsorily. |
| 47E9 | BC SM INITIALIZATION START | The initialization of the BC extension table was started (SM = shared memory). |
| 47EA | BC SM INITIALIZATION END | The initialization of the BC extension table was completed (SM = shared memory). |
| 47EB | BC SM INITIALIZATION FAILED | The initialization of the BC extension table failed (SM = shared memory). |
| 7FF1-02 | COPY ABNORMAL END (MULTIPLE PAIRS) | Multiple copies ended abnormally. This reference code is reported at five-minute intervals. If a pair ended abnormally, the pair status changes to PSUE. |
| FFFF | Reference Code unknown | The reference code is unknown. |

Splitting pairs

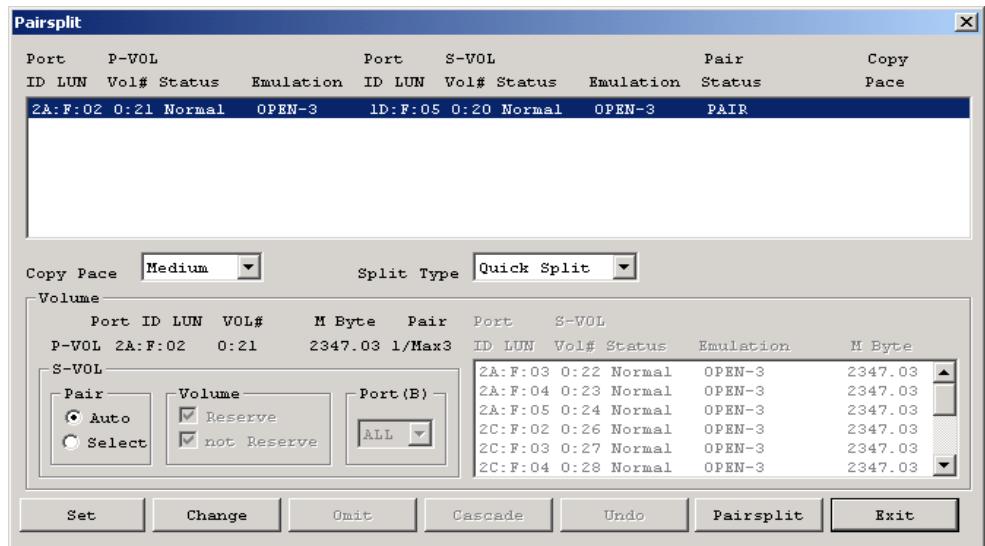
The Pairsplit window displays information for the volumes or pairs selected on the BC main window and allows you to split pairs.

Splitting one or more volume pairs

Caution

If you want the split S-VOLs to be identical to the P-VOLs, stop all writes to the P-VOLs before adding and splitting the pairs. This ensures that there are no updates to the S-VOLs while the pairsplit is synchronizing the S-VOLs to the P-VOLs.

1. On the BC main window, check **Pair** in the Display box and select the port from the Port drop-down box.
2. Check **Pair** in the Volume box.
3. Select the pair types you want to split from the **Pair** box.
You cannot PSUS split PSUE error suspended pairs.
4. Select the pairs you want to split, and click **Pairsplit** to open the Pairsplit window.



5. On the Pairsplit window, set the **Copy Pace** for all pairs being split:

Slower (one track at a time).

Medium (three tracks at a time).

Faster (fifteen tracks at a time).

The slower pace minimizes the impact on disk array I/O performance, while the faster pace completes the split as quickly as possible.

6. Select the **Split Type** from the drop-down box:

Quick Split: Use this option when fast access to S-VOL data is more important than the performance level. Place the P-VOL offline and then split (PSUS) the pair before using the S-VOL. This allows access to the S-VOL with the latest P-VOL information within a few seconds even though the data is still being resynchronized in the background.

Steady Split: Use this option when it's important that the P-VOL and S-VOL have maximum performance.

7. Verify that the Pairsplit window displays the pairs you indicated on the BC main window.

If you want to remove any pairs from the list, select the pairs and click **Omit**.

8. Select the pair you are splitting.

To select the S-VOL automatically, click **Auto** in the **S-VOL/Pair** box. The disk array selects a S-VOL for the P-VOL by LDEV ID from a reserved pair.

To select the S-VOL manually, click **Select** in the **S-VOL/Pair** box, select the port, click **Volume/Reserve** to display reserved volumes, and click the S-VOL.

9. Click **Set** to add this pair to the list.
10. Repeat steps 6 through 9 until all the pairs you want are displayed.

If you want to change an S-VOL for a pair which is already set, select the pair, select the S-VOL to replace the existing S-VOL, and click **Change**.

Click **Set** to add S-VOLs.

Click **Omit** to remove pairs.

11. When the pairs you want to split are set, click **Split** to split all pairs in the list.

12. When the confirmation window appears:

Click **Yes** to split the pairs.

Click **No** to cancel your request and return to the BC main window.

Click **Cancel** to cancel your request and return to the Pairsplit window.

Caution

The P-VOL and S-VOL are synchronized only when the pair status changes from COPY(SP) or PSUS(SP) to PSUS. This transition can take up to several minutes while BC performs asynchronous update copy.

When the split starts, the Pairdisplay window opens automatically to show the new pairs with COPY(SP) or PSUS(SP) status (or PSUS status if there were no pending copy actions).

13. Click **OK** to return to the BC main window.

Adding and splitting one or more new volume pairs at the same time

Caution

If you want the split S-VOLs to be identical to the P-VOLs, stop all writes to the P-VOLs before adding and splitting the pairs. This ensures that there are no updates to the S-VOLs while the pairsplit is synchronizing the S-VOLs to the P-VOLs.

1. On the BC main window, check **Volume** in the Display box and select the port from the Port drop-down box.

2. Display unreserved SMPL volumes by setting the following in the Volume box:

Uncheck **Attribute/Reserve**.

Check **Volume/nonPair**.

Uncheck **Volume/Pair**.

3. In the Pair box, check the **SMPL** box.

4. Select the volumes which will be the S-VOLs of the new split pairs to be added, and click **Pairsplit** to open the Split Volume Pair window.

5. In the Copy Pace drop-down box, set the copy pace for all pairs being split:

Slower (one track at a time).

Medium (three tracks at a time).

Faster (fifteen tracks at a time).

The slower pace minimizes the impact on disk array I/O performance, while the faster pace completes the split as quickly as possible.

6. Verify that the Pairsplit window displays the volumes you selected on the BC main window.

If you want to remove any volumes from the list, select the volumes, and click **Omit**.

7. Add the S-VOLs to the P-VOLs by selecting the P-VOL from the list of pairs to be split.

To assign an S-VOL automatically, click **Auto** in the S-VOL/Pair box. The disk array selects the S-VOL from the set of reserved volumes by LDEV ID (in order, lowest to highest).

To assign an S-VOL manually, click **Select** in the S-VOL/Pair box, click **Reserve** in the S-VOL/Volume box, select the port, and select the S-VOL from the list.

8. Click **Set** to add the S-VOL to the selected P-VOL. The S-VOL now displays next to the selected P-VOL.

If you want to change an S-VOL for a pair which is already set, select the pair, select the S-VOL to replace the existing S-VOL, click **Change**.

Click **Omit** to remove pairs.

9. If you want to add a second or third S-VOL to the same P-VOL, repeat steps 7 and 8.

Make sure that the selected pairs are split (status = PSUS). Each pair to be added displays separately in the list of pairs on the Paircreate Dialog window.

10. When the pairs you want to create and split are set, click **Pairsplit** to split all pairs in the list.

11. When the confirmation window appears:

Click **Yes** to split the pairs.

Click **No** to cancel your request and return to the BC main window.

Click **Cancel** to cancel your request and return to the Pairsplit window.

Caution

The P-VOL and S-VOL are synchronized only when the pair status changes from COPY(SP) or PSUS(SP) to PSUS. This transition can take up to several minutes while BC performs asynchronous copy updates.

When pairsplit starts, the Pairdisplay window opens automatically to show the new pairs with COPY(SP) or PSUS(SP) status.

12. Click **Refresh** to monitor pairsplit progress, or click **OK** to return to the BC main window.

Resynchronizing pairs

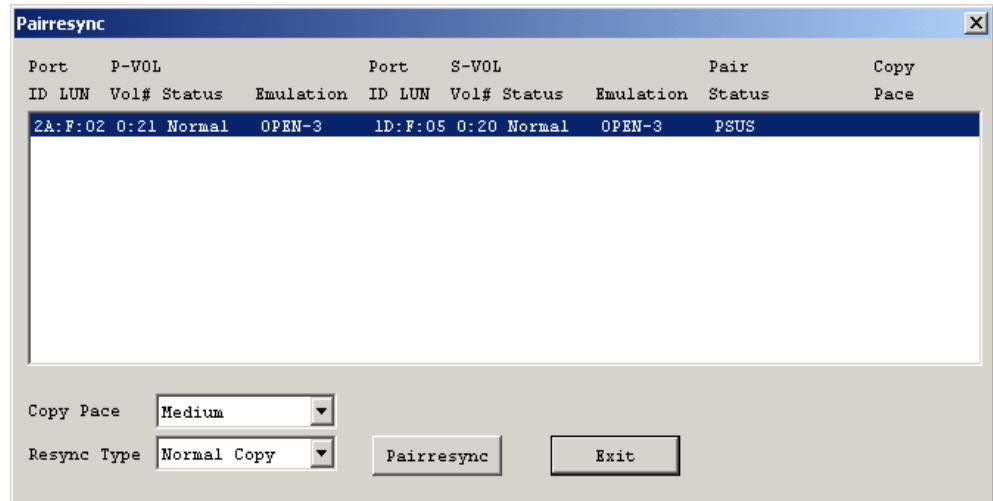
The Pairresync window allows you to resynchronize (resync) one or more split (PSUS) or suspended (PSUE) pairs.

1. Unmount the split S-VOLs before starting pairresync. When pairresync starts, the disk array will stop accepting write I/Os to the S-VOL.
2. On the BC main window, check **Pair** in the Display box and select the port from the Port drop-down box.
3. Select the pair display options in the Pair box.

Example

Check **PSUS** and **PSUE** to display only split and suspended pairs.

4. On the BC main window, click the pairs you want to resynchronize, and click **Pairresync** to open the Pairresync window.



5. On the Pairresync window, select the pair(s) you want to resync.

6. In the Copy Pace drop-down box, set the copy pace for all pairs being resynchronized:

Slower (one track at a time).

Medium (three tracks at a time).

Faster (fifteen tracks at a time).

The slower pace minimizes the impact on disk array I/O performance, while the faster pace completes the resync as quickly as possible.

7. Select the Resync Type for each pair from the drop-down box:

Normal copy pairresync: Use normal copy pairresync when P-VOL and S-VOL performance is crucial. The copy direction for a normal pairresync is P-VOL to S-VOL. While a pairresync for a PSUS pair can be very fast, the resync operation for a PSUE pair takes just as long as an initial copy.

Quick pairresync: Use quick pairresync when access to the latest P-VOL data on the S-VOL is more important than the performance level. The copy direction for quick pairresync is P-VOL to S-VOL.

Reverse copy pairresync: Use reverse pairresync when the S-VOL data is the most current. The copy direction for reverse pairresync is S-VOL to P-VOL. For more information on reverse pairresync, see “Reverse pairresync” [\(page 17\)](#).

Quick restore pairresync: Quick restore speeds up reverse copy pairresync by changing the volume map in the disk array to swap the contents of the P-VOL and S-VOL without copying the S-VOL data to the P-VOL. The copy direction for quick restore is S-VOL to P-VOL.

Caution

During quick restore, the RAID levels, HDD types, and Cache LUN settings are swapped. To avoid performance impacts, follow the information in “Quick pairresync” [\(page 17\)](#).

8. When you are ready to start the resync, click **Pairresync**. A warning window to reminds you to place the S-VOLs offline before starting resync. Make sure the S-VOLs are offline, and click **OK**.

9. When the confirmation window appears:

Click **Yes** to resynchronize the pairs. The Resynchronize Volume Pair window now displays a pair status of COPY or PAIR.

Click **No** to cancel your request and return to the BC main window.

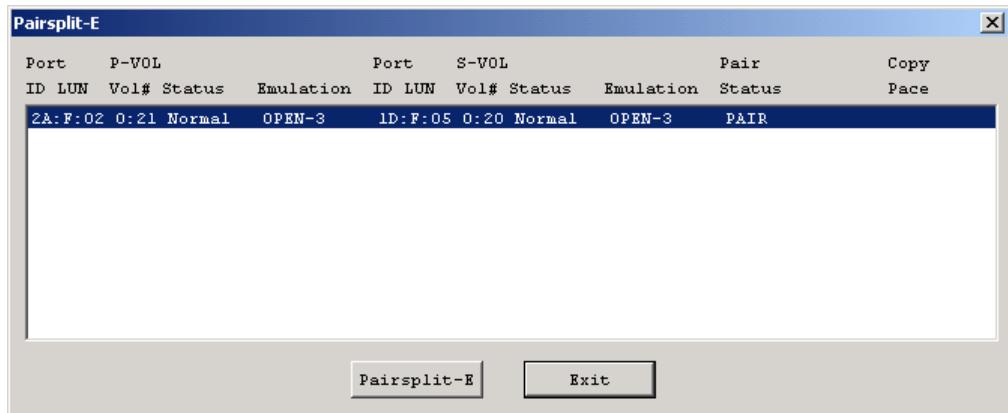
Click **Cancel** to cancel your request and return to the Pairresync window.

10. Repeat steps 7 through 9 to resynchronize additional pairs in the list, or click **Exit** to return to the BC main window.

Suspending pairs

The Pairsplit –E window displays information for the pairs selected on the BC main window and allows you to suspend (PSUE) the pairs.

1. On the BC main window, click **Volume** or **Pair** in the Display box to display volumes or pairs, and select the port from the Port drop-down box.
2. Select the types of pairs you want to suspend from the Pair box on the BC main window.
3. Select the pairs you want to suspend (or the volumes whose pairs you want to suspend), and click **Pairsplit –E** to open the Pairsplit –E window.



4. On the Pairsplit –E window, select the pairs you want to suspend (PSUE), and click **Pairsplit –E**.
5. When the confirmation window appears:
Click **Yes** to suspend (PSUE) the pairs. The Pairsplit –E window displays a pair status of PSUE.
Click **No** to cancel your request and return to the BC main window.
Click **Cancel** to cancel your request and return to the Pairsplit –E window.
6. Repeat steps 4 and 5 to suspend additional pairs in the list, or click **Exit** to return to the BC main window.

Deleting pairs

The Pairsplit –S window displays information for the pairs selected on the BC main window and allows you to delete (SMPL) the pair relationship (not the volumes).

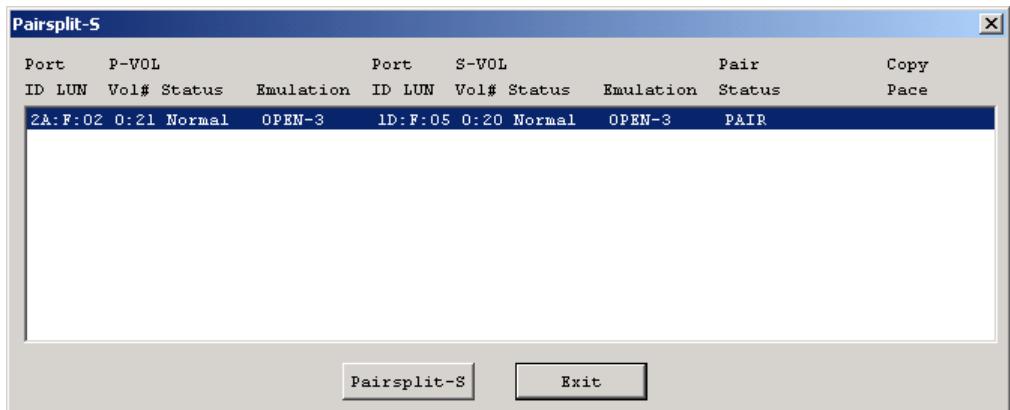
1. If you want to synchronize the P-VOL and S-VOL before deleting the pair:

Wait until all write I/Os to the P-VOL are complete, then take the P-VOL offline to prevent the P-VOL from being updated during or after the split (PSUS).

After the P-VOL is offline, split the pair to copy all COPY(PD) updates to the S-VOL.

When the pair status changes to PSUS, the P-VOL and S-VOL are synchronized.

2. On the BC main window, click **Volume** or **Pair** in the Display box to display volumes or pairs, and select the port from the Port drop-down box.
3. Select the types of pairs you want to delete from the Pair box.
4. Select the pairs that you want to place in SMPL status (or the volumes whose pairs you want to delete), then click **Pairsplit –S** to open the Pairsplit –S window.



5. Select the pairs, and click **Pairsplit –S**.

6. When the confirmation window appears:

Click **Yes** to delete the selected pairs. If you deleted all pairs on the Pairsplit –S window, you are returned to the BC main window. If not, the Delete Volume Pair window displays the remaining pairs.

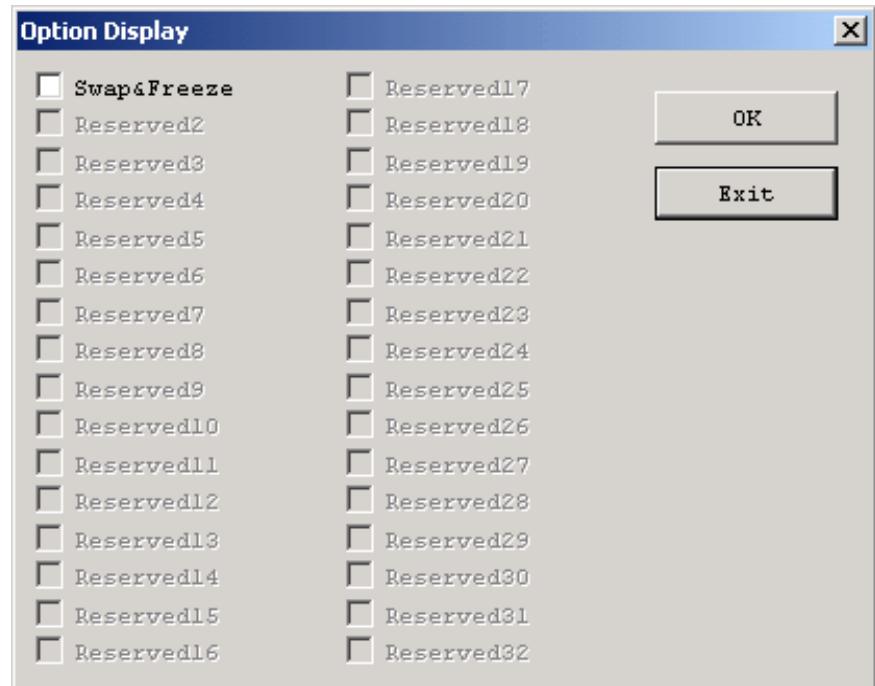
Click **No** to cancel your request and return to the BC main window.

Click **Cancel** to cancel your request and return to the Pairsplit –S window.

7. Repeat steps 2 through 6 to delete (SMPL) additional pairs, or click **Exit** to return to the BC main window.

Setting options

The Option Display window allows you to select options for BC.



To set options for BC:

1. On the BC main window, click **Option** to open the Option Display window. The Option Display window shows the current status of the option. (If a check box is gray, the option is not available.)
2. Select the check boxes you want to set.
3. Click **OK** to confirm the settings.
4. Click **Exit** to return to the BC main window.

4

Troubleshooting

This chapter discusses general strategies to troubleshoot BC and provides a list of error codes.

General troubleshooting

The table below provides general troubleshooting instructions for BC operations. If both a BC error code and corresponding message are displayed on the remote console PC, see the table on [page 78](#) for a description of the error condition and recommended corrective actions.

Use the FDCOPY function (see the *HP StorageWorks Remote Control XP: User's Guide*) to copy the Remote Control configuration information onto diskette, and give the diskette(s) to your HP representative, when requested.

| Error | Corrective Action |
|--|---|
| The system hangs, or BC operations do not function properly. | <p>If Performance Advisor (PA) is running, exit it before starting Remote Control and connecting with BC.</p> <p>Make sure all BC requirements are met.</p> <p>Make sure the disk array is powered on and fully functional.</p> <p>Check all input values and parameters to make sure you entered the correct information on the BC screens (for example, P-VOL and S-VOL IDs).</p> |
| Channel enable LED indicators on the disk array control panel are off or flashing. | Contact the HP support center. |
| The volume pairs are not displaying correctly. | Make sure the correct CU (control unit) image is selected. |
| A warning is displayed on the remote console PC. | Locate the R-SIM (remote service information message) using the Remote Control R-SIM window. See the <i>Familiarization Guide</i> for a listing of SIMs (service information messages). |

(continued)

| Error | Corrective Action |
|---|--|
| A BC error message is displayed on the remote console PC. | See the error codes in the next section. |
| There is a problem with the remote console PC or BC software. | Make sure that the problem is not being caused by the PC or LAN hardware or software. Try restarting the PC and reconnecting to the disk array. If the problem persists, contact the HP support center. |
| Failure requiring dynamic sparing and automatic correction copy | If a failure occurs that requires the disk array to utilize dynamic sparing or automatic correction copy, the status of the paired volumes associated with the failed physical device will not be affected. |
| The BC pair status is incorrect (or unexpected) | The pair may have been suspended or deleted from the UNIX®/PC host using the HP Command Control Interface (CCI). If not, the disk array detected an error condition when BC was running. Check the R-SIMs reported to the remote console PC. If necessary, call the HP support center. |
| Disk array is overloaded | If you use BC with an overloaded disk array, host I/O performance may be degraded. You must increase cache, disk adapters, and/or RAID groups. Assign S-VOLs in the newly installed RAID groups. |

PDEV, LDEV, and cache maintenance

The table below explains the actions to take with BC during maintenance.

| Parameter | Requirement |
|------------------------------------|--|
| Physical device (PDEV) maintenance | If a PDEV requires maintenance, the status of the logical volumes associated with that PDEV will not be affected. However, if PDEV maintenance requires access to a BC S-VOL, the pair must be deleted and any reserve attribute must be reset (unreserved). |
| Logical device (LDEV) maintenance | LDEV maintenance cannot be performed on LDEVs that are assigned to BC pairs. If LDEV maintenance requires access to a BC LDEV, the pair must be deleted and the reserve attribute must be reset (unreserved). |
| Cache maintenance | If cache maintenance is performed during a period of high I/O usage, one or more BC pairs may be suspended. Reduce the I/O load before performing cache maintenance. |

Shutting down the power supply

If you have to switch off the disk array power supply when BC is running, ensure the following:

1. First complete copying for the pair in the COPY(SP) status to change the pair status from COPY(SP) to PSUS, and then switch off the power supply.
2. Establish a timetable for any BC copying operations that may take longer because the power supply is off.
3. If the shared memory is volatilized when you switch on the power supply, the following conditions will occur:

If a pair was in COPY(SP) status, it changes to PSUE.

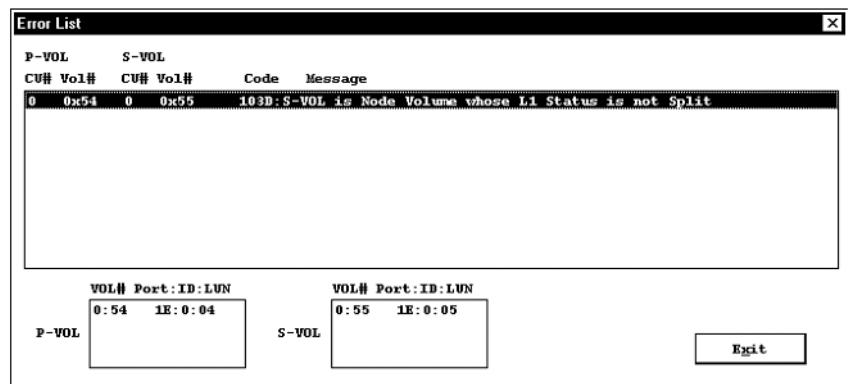
If a pair was in COPY(PD) or COPY(SP) status, data that was already copied before the power was switched off becomes the target data to be copied after the power supply turns on. Even if there is no host I/O, the data consistency rate does not reach 100% when the BC pair status changes to PAIR. When the BC pair status changes to PAIR, the target data is copied to the secondary volume.

If a pair was in the PAIR status, data that was already copied before the power was switched off becomes the target data to be copied after you switch on the power supply. In this case, the data consistency rate is 0% and the target data is copied to the secondary volume.

If a pair was in the PSUS status, the entire volume becomes the differential data. In this case, the data consistency rate is 0% and the entire volume is copied to the secondary volume when you perform the pairresync operation.

Error codes

BC displays error messages on the remote console PC when error conditions occur. The following figure shows the Error List window, which displays the CU number, volume number, port, TID, and LUN of the affected volume, and the Business Copy error code and message. The Error List window opens automatically when an error occurs.



| Error Code | Description | Corrective Action |
|------------|--|---|
| 0401 | A locking timeout was detected during internal processing. | A retry can result in a normal termination. Wait five seconds and retry. |
| 0402 | A command (PAIR, PSUS, or Reserve Volume) could not be completed because it was not in SMPL status internally. | A retry can result in a normal termination. Wait five seconds and retry. |
| 0801 | The BC feature could not be used. | Make sure the disk array has the correct level for BC, the SVP has BC installed and enabled, and the Remote Console PC has BC installed and enabled. |
| 080B | The request could not be accepted. | Wait one minute and retry. |
| 0810 | The specified command cannot be accepted in this status. (The command was rejected.) <ol style="list-style-type: none"> <li data-bbox="203 831 717 900">1. The specified command cannot be executed for the selected pair. <li data-bbox="203 917 717 986">2. The specified command cannot be executed for the selected volume. <li data-bbox="203 1003 717 1116">3. The quick restore operation cannot be executed for the pair that consists of a normal volume and a VLL volume. | For 1 and 2: Check the pairdisplay and volume status, and make sure the pair and volume status are correct for the desired command. If the status is incorrect, wait until the status changes, or change the status and retry. For 3: Retry by performing the reverse pairresync operation. For quick restore requirements, see the table on page 19 . |
| 0811 | The specified command is treated as an NOP. | The command has no effect. It ends without errors but does not execute. |
| 0812 | The new pair could not be created because a path group is set. | Disconnect from the host, or cancel the CA path. On the CA screen, confirm the specified S-VOL is in SMPL status, specify the Delete Pair by Force option, and retry the same operation. For detail on the Delete Pair by Force option, see the <i>HP StorageWorks Continuous Access XP: User's Guide</i> . |

(continued)

| Error Code | Description | Corrective Action |
|-------------------|---|---|
| 0813 | The Pairsplit command was issued to a pair in PSUS status. | Nothing, or issue a different command since the pair is already in PSUS (split) status. |
| 0814 | The PAIR command was issued to the pair in PAIR status. | Nothing, or issue the paircreate command to volumes requiring pairing. |
| 0817 | A Reserve volume cannot be set because a path group is set. | Disconnect the volume to be reserved from the host, or cancel the CA path. |
| 0818 | The Pairresync or Pairsplit-E command cannot be issued because a path group is set. | Unmount the S-VOL (from the host), or delete the CA path. |
| 081F | Command Reject. P-VOL is used from CA. | Disconnect from the host, or cancel the CA path. |
| 0830 | A pair cannot be created because the track format is different. | Make sure that the emulation type of the P-VOL and S-VOL is the same. |
| 0831 | A pair cannot be created because the number of slots is different. | Make sure that the capacity of the P-VOL and S-VOL is the same. |
| 0834 | The emulation type of the specified P-VOL is not supported by BC. | Make sure that the P-VOL's emulation type is supported by BC. |
| 0835 | The emulation type of the specified S-VOL is not supported by BC. | Make sure that the S-VOL's emulation type is supported by BC. |
| 0836 | The pair cannot be created. | The P-VOL and S-VOL emulation types are not the same. |
| 0840 | Logical contradiction. | Call the HP support center for assistance. |
| 0841 | Logical contradiction. | Call the HP support center for assistance. |
| 0842 | Logical contradiction. | Call the HP support center for assistance. |
| 0848 | Logical contradiction. | Call the HP support center for assistance. |
| 0849 | Logical contradiction. | Call the HP support center for assistance. |
| 084A | Logical contradiction. | Call the HP support center for assistance. |

(continued)

| Error Code | Description | Corrective Action |
|-------------------|--|--|
| 084B | Logical contradiction. | Call the HP support center for assistance. |
| 0852 | Command Reject. P-VOL and S-VOL are used from host or by CA. | Disconnect from the host, or cancel the CA path. |
| 0880 - 08FF | Logical contradiction. | Call the HP support center for assistance. |
| 0C70 | A P-VOL is not installed. | Install a volume as a P-VOL. |
| 0C71 | The P-VOL cannot be used. | Call the HP support center to make the P-VOL status normal. |
| 0C72 | The P-VOL is being formatted. | Wait until the formatting of the P-VOL completes. |
| 0C80 | An S-VOL is not installed. | Install a volume as an S-VOL. |
| 0C81 | The S-VOL cannot be used. | Call the HP support center to make the P-VOL status normal. |
| 0C82 | The S-VOL is being formatted. | Wait until the formatting of the S-VOL completes. |
| 0C90 | The volume to be Reserved is not installed. | Volumes not installed cannot be processed. |
| 0C91 | The volume to be Reserved cannot be used. | Call the HP support center to make the volume status normal. |
| 0C92 | The volume to be Reserved is being formatted. | Wait until the formatting of the volume completes. |
| 1001 | Logical contradiction. | Call the HP support center for assistance. |
| 1002 | Logical contradiction. | Call the HP support center for assistance. |
| 1003 | Logical contradiction. | Call the HP support center for assistance. |
| 1004 | Logical contradiction. | Call the HP support center for assistance. |
| 1005 | Logical contradiction. | Call the HP support center for assistance. |
| 1007 | Logical contradiction. | Call the HP support center for assistance. |

(continued)

| Error Code | Description | Corrective Action |
|-------------------|--|--|
| 1009 | The number of BC pairs exceeded the maximum. | Delete some of the pairs. |
| 1010 | Logical contradiction. | Call the HP support center for assistance. |
| 1011 | The number of the volume specified to be a Reserve volume has already been used for a Reserve volume. | Change the HDEV number for specifying a reserved volume. |
| 1012 | The number of the volume specified to be a Reserve volume has already been used for a primary MRCF (mainframe) volume. | Change the HDEV number for specifying a reserved volume. |
| 1013 | The number of the volume specified to be a Reserve volume has already been used for a hierarchical control primary volume. | Change the HDEV number for specifying a reserved volume. |
| 1014 | The number of the volume specified to be a Reserve volume has already been used for a hierarchical control destination volume. | Change the volume number for specifying a reserved volume. |
| 1015 | The volume specified to be a Reserve volume is not set as a Reserve volume. | Check the volume status. |
| 1016 | The volume can appropriately be allocated as an S-VOL does not exist among Reserve volumes. | Delete any reserved volume which can be allocated as an S-VOL. |
| 1017 | A Reserve volume cannot be set because the maximum number of Reserve volumes was exceeded. | Delete any of the reserved volumes |
| 101E | Reserve volume does not exist in the system. | Set one or more reserved volumes. |
| 1026 | It is impossible to make a pair any more because the volume which was specified as a P-VOL is a root volume already | Delete some of the pairs (root volume = P-VOL in an L1 pair). |

(continued)

| Error Code | Description | Corrective Action |
|-------------------|--|---|
| 1027 | It is impossible to make a pair any more because the volume which was specified as P-VOL is a node volume already. | Delete some of the pairs (node volume = P-VOL in an L2 pair). |
| 1028 | It is impossible to make a pair because the volume which was specified as P-VOL is a leaf volume already. | Confirm a pair condition. (Leaf volume = S-VOL in an L2 pair.) |
| 1029 | It is impossible to make a pair because the volume which was specified as an S-VOL is a leaf volume already. | Confirm the pair condition. (Leaf volume = S-VOL in an L2 pair.) |
| 102A | The volume pair which exceeded the licensed capacity was created. | Check the capacity of the installed license key. To create more pairs, you need a license key which allows more capacity. |
| 1030 | The specified P-VOL number does not exist. | Retry after refreshing the window. |
| 102E | P-VOL is used as a source volume for Auto LUN | Confirm a matching condition. |
| 102F | P-VOL is used as a source volume for Auto LUN. | Confirm a matching condition. |
| 1031 | The specified P-VOL has been set as a Reserve volume. | Check the volume in the Pairdisplay window. |
| 1032 | No more pairs can be created for the specified P-VOL. | Delete any of the pairs formed by the P-VOL. |
| 1033 | The specified P-VOL is not a P-VOL. | Check the pair status. |
| 1037 | The specified P-VOL has been set as BC S-VOL. | Check the pair status. |
| 103A | The COPY(RS) command was issued to a device in SMPL status. | Check the pair status. |

(continued)

| Error Code | Description | Corrective Action |
|-------------------|--|---|
| 103B | It is impossible to make a pair because a volume which was specified as an S-VOL is a root volume already. | Confirm the pair condition (root volume = P-VOL in an L1 pair). |
| 103C | It is impossible to make a pair because the volume which was specified as an S-VOL is a node volume already. | Confirm the pair condition (node volume = S-VOL in an L1 pair.) |
| 103D | It is impossible for the L2 pair to require a split because the L1 pair is not in a split condition. | After splitting the L1 pair, re-execute. |
| 103E | A new pair was created with a P-VOL forming the CA cooperation pattern. | Place the BC pair in SMPL status, or place the CA pair which uses the BC S-VOL as a P-VOL in SMPL status. |
| 103F | A pair status cannot be changed to form the CA cooperation pattern. | Place the CA pair which uses the BC S-VOL as a P-VOL in PSUE or SMPL status. |
| 1040 | The specified S-VOL does not exist. | Set one or more reserved volumes. |
| 1042 | S-VOL is used as destination volume for Auto LUN. | Confirm a matching condition. |
| 1043 | The specified S-VOL number has already been used as an S-VOL. | Check the pair status. |
| 1044 | The specified S-VOL is not a BC S-VOL. | Check the pair status. |
| 1046 | The specified secondary volume is being used as a CA P-VOL. | Delete the CA pair. |
| 1047 | The specified secondary volume is being used as a CA S-VOL. | Delete the CA pair. |
| 104A | The specified secondary volume is being used as an MRCF (mainframe) P-VOL. | Check the pair status. |
| 104B | S-VOL is used as source volume for Auto LUN XP. | Confirm a matching condition. |

(continued)

| Error Code | Description | Corrective Action |
|-------------------|---|---|
| 104E | The volume specified as a Reserve volume is being used as a CA P-VOL. | Delete the CA pair. |
| 104F | The volume specified as a Reserve volume is being used as an S-VOL. | Delete the CA pair. |
| 1050 | The specified P-VOL and S-VOL are not a BC pair. | Check the pair status. |
| 1051 | The volume numbers of the specified P-VOL and S-VOL are the same. | Retry after refreshing the screen. |
| 1053 | Request could not be accepted. | Confirm a matching condition. |
| 1054 | Request could not be accepted. | Confirm a matching condition. |
| 1058 | S-VOL is a node volume whose L2 status is SP-Pend. | Confirm a matching condition. |
| 1070 | The status mode specification (status mode) in the Status Check command is incorrect. | Call the HP support center for assistance. |
| 1071 | The status classification (statusindc) in the Status Check command is incorrect. | Call the HP support center for assistance. |
| 1072 | The CU number specified by the Status Check command (volume status) does not exist. | Call the HP support center for assistance. |
| 1084 | Volume was used for reserve volume of Auto LUN. | Check the volume, or cancel the Auto LUN reserved volume. |
| 1085 | P-VOL was used for reserve volume of Auto LUN. | Check the P-VOL, or cancel the Auto LUN reserved volume. |
| 1086 | S-VOL was used for reserve volume of Auto LUN. | Check the S-VOL, or cancel the Auto LUN reserved volume. |
| 1087 | P-VOL is used as source volume for Auto LUN. | Confirm a matching condition. |

(continued)

| Error Code | Description | Corrective Action |
|-------------------|---|--|
| 1095 | Request could not be accepted because status of pair who shared with P-VOL was reverse-copy. | Confirm a matching condition. |
| 1096 | Request could not be accepted because the L1 pair status was reverse-copy. | Confirm a matching condition. |
| 1097 | Request could not be accepted because the L2 pair status was reverse-copy. | Confirm a matching condition. |
| 1098 | Reverse-Copy could not be accepted because the pair status was not Split. | Confirm a matching condition. |
| 1099 | Reverse-copy to L2 pair could not be accepted because status of pair who shared with P-VOL was neither Split nor Suspend. | Confirm a matching condition. |
| 109A | Reverse-copy could not be accepted because P-VOL was shared with CA P-VOL whose status was not Suspend. | Confirm a matching condition. |
| 109B | Reverse-copy could not be accepted because P-VOL was shared with CA S-VOL whose status was not Suspend. | Confirm a matching condition. |
| 109C | Reverse-copy could not be accepted because S-VOL was shared with CA P-VOL. | Confirm a matching condition. |
| 10C0 | The Swap&Freeze option could not be accepted because the disk array disabled the quick restore. | Change the disk array setting to enable the quick restore. |

Glossary

| | |
|------------------------|---|
| BC | HP StorageWorks Business Copy XP. BC lets you maintain up to nine internal copies of logical volumes on the disk array. |
| CA | HP StorageWorks Continuous Access XP. CA lets you create and maintain duplicate copies of logical volumes on a remote disk array. |
| CLI | Command line interface. |
| emulation modes | The logical devices (LDEVs) in each RAID group can have one of the following emulation modes. The emulation mode determines the capacity of the LDEV. |
| OPEN-3: | 2.29 GB |
| OPEN-8: | 6.84 GB |
| OPEN-9: | 6.88 GB |
| OPEN-E: | 13.56 GB |
| OPEN-K: | 1.74 GB <i>(XP48/XP256/XP512 only)</i> |
| OPEN-L: | 33.94 GB |
| OPEN-M: | 43.94 GB <i>(XP48/XP256/XP512 only)</i> |
| OPEN-V: | 60.0 GB <i>(XP128/XP1024 only)</i> |
| GB | Gigabytes. |
| HBA | Host bus adapter. |
| host mode | Each port can be configured with various host modes. The host mode determines the array's behavior toward a specific host. |
| HP | Hewlett-Packard Company. |

| | |
|---------------|---|
| LDEV | Logical device. An LDEV is created when a RAID group is divided into sections using a host emulation mode (for example, OPEN-9 or OPEN-M). The number of resulting LDEVs depends on the emulation mode. The term LDEV is often used synonymously with the term volume. |
| LU | Logical unit. |
| LUN | Logical unit number. A LUN results from mapping a SCSI logical unit number, port ID, and LDEV ID to a RAID group. The size of the LUN is determined by the emulation mode of the LDEV, and the number of LDEVs associated with the LUN. For example, a LUN associated with two OPEN-3 LDEVs will have a size of 4,693 MB. |
| LUSE | Logical Unit Size Expansion. A feature which logically combines LDEVs so they appear as a larger LDEV. This allows a LUN to be associated with 2 to 36 LDEVs. Essentially, LUSE makes it possible for applications to access data requiring a large amount of disk space. |
| MB | Megabytes. |
| OPEN-x | A general term describing any one of the supported OPEN emulation modes (for example, OPEN-3, OPEN-9, OPEN-L, etc.). |
| | Supported emulation modes: OPEN-3/8/9/E/L. |
| XP48 | |
| XP256 | |
| XP512 | |
| | OPEN-K/M are also supported. |
| XP128 | |
| XP1024 | |
| | OPEN-V is also supported. |
| P-DEV | Physical device. |
| P-VOL | Primary volume. |
| PA | HP StorageWorks Performance Advisor. |

| | |
|--------------------------|---|
| path | “Path” and “LUN” are synonymous. Paths are created by associating a port, a target, and a LUN ID with one or more LDEVs. |
| port | The number of ports on an XP disk array depends on the number of supported I/O slots and the number of ports available per I/O adapter. The XP family of disk arrays supports Fibre Channel and SCSI ports. <i>I/O support may vary with the selected disk array.</i> |
| | Ports are named based upon their port group and port letter. Examples of port names include CL1-A through CL1-R and CL2-A through CL2-R (letters I and O are skipped). |
| RAID | Redundant array of independent disks. |
| RC | HP StorageWorks Remote Control XP. A software product used for managing XP arrays. |
| remote console PC | The PC running HP StorageWorks Remote Control XP. |
| R-SIM | Remote service information message. |
| S-VOL | Secondary volume. |
| SCSI | Small computer system interface. |
| SIM | Service information message. |
| SNMP | Simple Network Management Protocol. |
| SVP | Service processor. A laptop computer inside the disk array. It is used by the HP service representative only. |
| TB | Terabytes. |
| TID | Target ID. |
| VSC | Volume Size Configuration. |

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